APPENDIX H

Revised Traffic Modeling Data and
Fair-Share Calculations for Mitigation Recommended

Existing No Project AM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	1941	veh/h
Peak-hour factor, PHF	0.97	
Peak 15-min volume, v15	500	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1071	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1071	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.5	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Aiport
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	1904	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	517	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1087	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1087	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.7	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	1982	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	539	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1131	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1131	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.4	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2097	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	570	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1197	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1197	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	1984	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	539	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1132	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1132	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.4	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2442	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	664	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1394	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1394	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2652	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	721	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1513	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1513	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	23.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2777	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	755	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1585	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1585	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2974	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	808	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1697	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1697	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	26.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2984	veh/h
Peak-hour factor, PHF	0.93	
Peak 15-min volume, v15	802	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1685	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1685	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	26.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4555	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1265	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1805	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1805	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.9	mi/h
Number of lanes, N	3	
Density, D	28.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to ~~Louise~~ Lathrop
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2700	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	750	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1605	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1605	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: ~~Louise~~ Lathrop to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2700	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	750	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1605	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1605	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4119	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1144	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1632	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1632	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	3	
Density, D	25.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4256	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1182	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1687	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1687	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	3	
Density, D	26.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1904	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	114	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1904	114		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	517	36		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2173	146		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2173$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2173	4700	No
$v_{FO} = v - v_R$	2027	4700	No
v_R	146	2000	No
$v_{3 \text{ or } av34}$	0	pc/h	(Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$? No

If yes, v_{12A} = (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2173	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 21.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.441

Space mean speed in ramp influence area, S_R = 54.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.9 mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1790	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	192	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1790	192		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	486	52		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2043	214		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2043$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2257	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\ v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2043	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R12} + 0.0078\ v_{A} - 0.00627\ L = 19.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $M_S = 0.323$

Space mean speed in ramp influence area, $S_R = 57.6$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 57.6$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1982	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1982	130		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	539	41		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2262	167		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2262$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2262	4700	No
$v_{FO} = v - v_R$	2095	4700	No
v_R	167	2000	No

$v_{3 \text{ or } av34} = v_{av34}$ = 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} = v_{av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34} = v_{av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2262	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 22.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.443

Space mean speed in ramp influence area, S_R = 54.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.8 mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1852	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	245	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1852	245		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	503	67		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2114	273		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
v = v (P) = 2114 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	2387	4700	No
FO			
v v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34			
Is v v	> 2700 pc/h?	No	
3 or av34			
Is v v	> 1.5 v /2	No	
3 or av34	12		
If yes, v =		(Equation 25-8)	
12A			

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	2114	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 20.8 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence C

_____Speed Estimation_____

Intermediate speed variable, M = 0.328
S
Space mean speed in ramp influence area, S = 57.4 mph
R
Space mean speed in outer lanes, S = N/A mph
0
Space mean speed for all vehicles, S = 57.4 mph
_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2452	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	270	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2452	270		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	666	71		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2798	291		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2798$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2798	4700	No
$v_{FO} = v - v_R$	2507	4700	No
v_R	291	2000	No

$v_{3 \text{ or } av34} = v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$? No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2798	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 27.0$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.454$

Space mean speed in ramp influence area, $S_R = 54.6$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.6$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2382	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	395	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2382	395		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	647	107		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%		%
Length	mi	mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2719	440		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
v = v (P) = 2719 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	3159	4700	No
FO			
v v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34			
Is v v	> 2700 pc/h?	No	
3 or av34			
Is v v	> 1.5 v /2	No	
3 or av34	12		
If yes, v =		(Equation 25-8)	
12A			

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	2719	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 26.8 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence C

_____Speed Estimation_____

Intermediate speed variable, M = 0.378
S
Space mean speed in ramp influence area, S = 56.3 mph
R
Space mean speed in outer lanes, S = N/A mph
0
Space mean speed for all vehicles, S = 56.3 mph

_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2777	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	207	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2777	207		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	755	54		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3169	223		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v_F - v_R) P_{FD} = 3169$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3169	4700	No
$v_{FO} = v_F - v_R$	2946	4700	No
v_R	223	2000	No

$v_{3 \text{ or } av34} = v_R$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3169	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 30.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.448$

Space mean speed in ramp influence area, $S_R = 54.7$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.7$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: ~~PM~~ AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2570	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	404	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2570	404		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	698	110		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2933	450		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
v = v (P) = 2933 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v FO	3383	4700	No

v v 0 pc/h (Equation 25-4 or 25-5)
3 or av34

Is v v > 2700 pc/h? No
3 or av34

Is v v > 1.5 v /2 No
3 or av34 12

If yes, v = (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v 12	2933	4400	No !

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 28.5 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence D

_____Speed Estimation_____

Intermediate speed variable, M = 0.401
S
Space mean speed in ramp influence area, S = 55.8 mph
R
Space mean speed in outer lanes, S = N/A mph
0
Space mean speed for all vehicles, S = 55.8 mph

_____

Leisch Method for Weaving Analysis

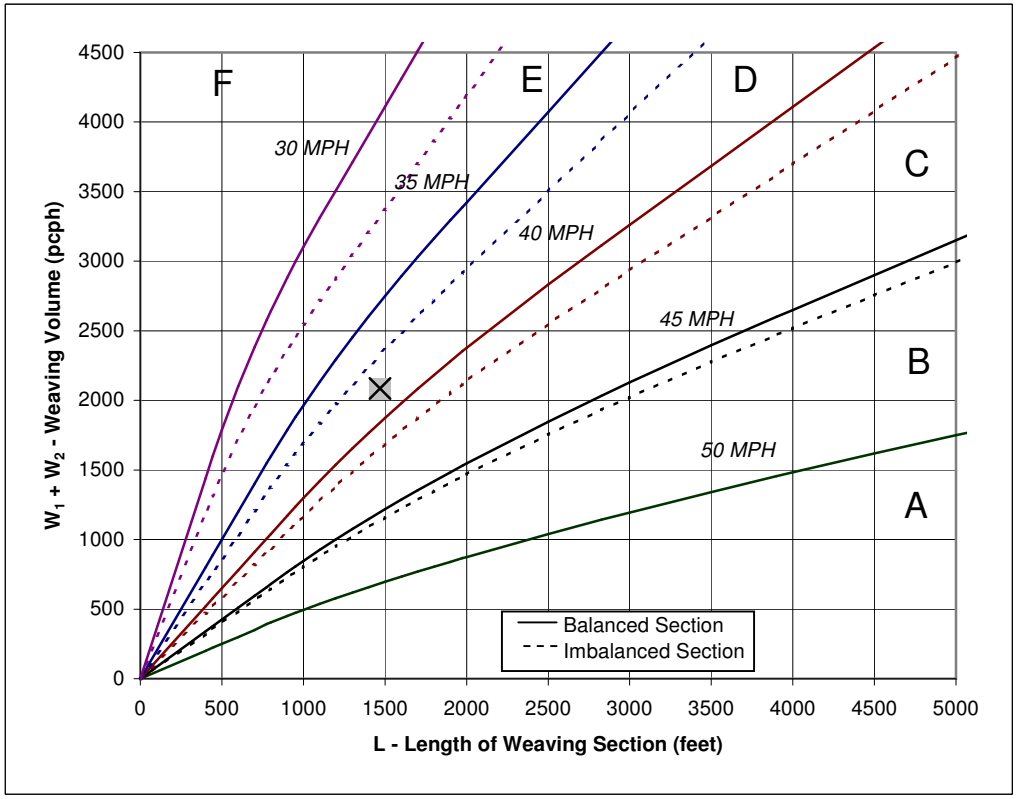
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

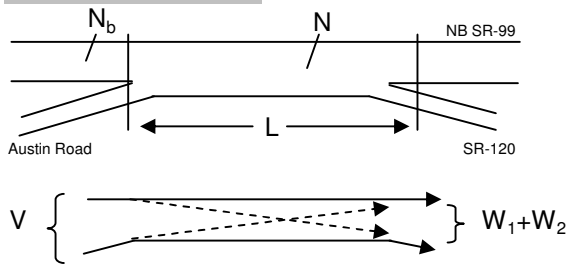
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,351	Volume (vph)*	96	Volume (vph)*	1,892
Truck Percentage	14%	Truck Percentage	6%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	4,656	Volume (pcph)	99	Volume (pcph)	1,987

Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - AM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **38.6**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,213**
6. Level of Service (LOS) **C**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

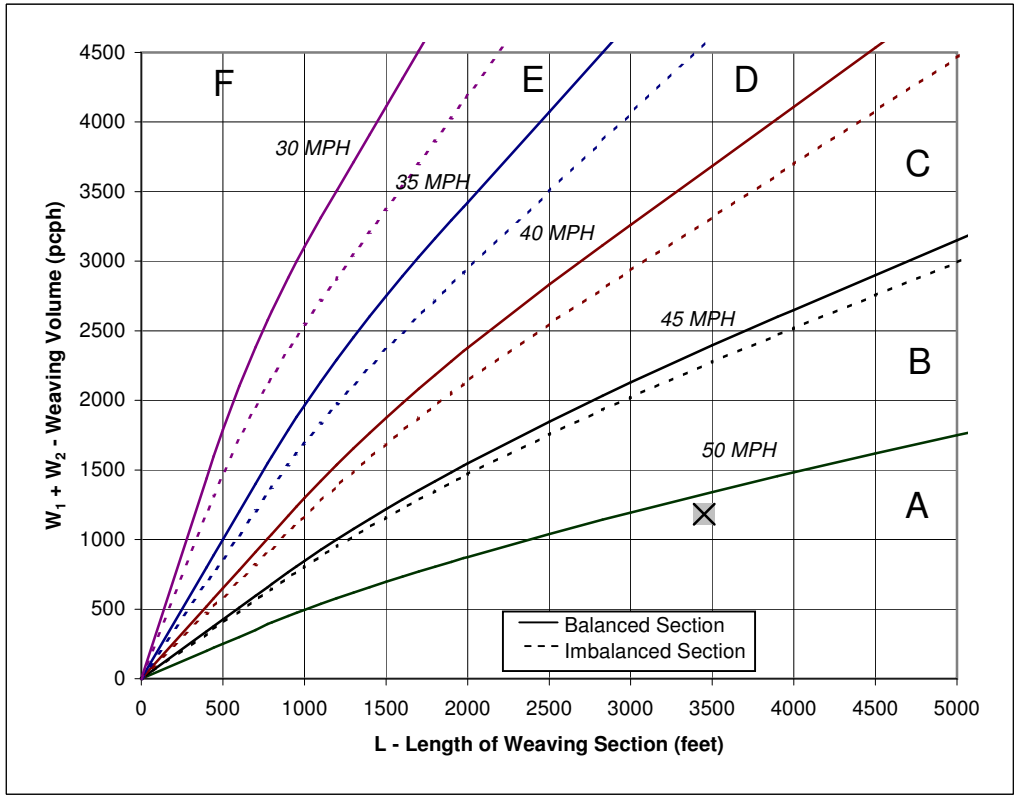
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

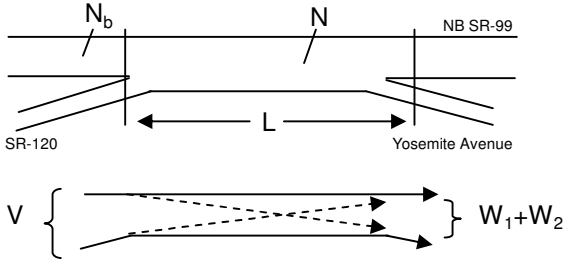
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,009	Volume (vph)*	275	Volume (vph)*	357
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,220	Volume (pcph)	550	Volume (pcph)	632

Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - AM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **50.7**
4. Weaving Intensity Factor (k) **1.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,073**
6. Level of Service (LOS) **C**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

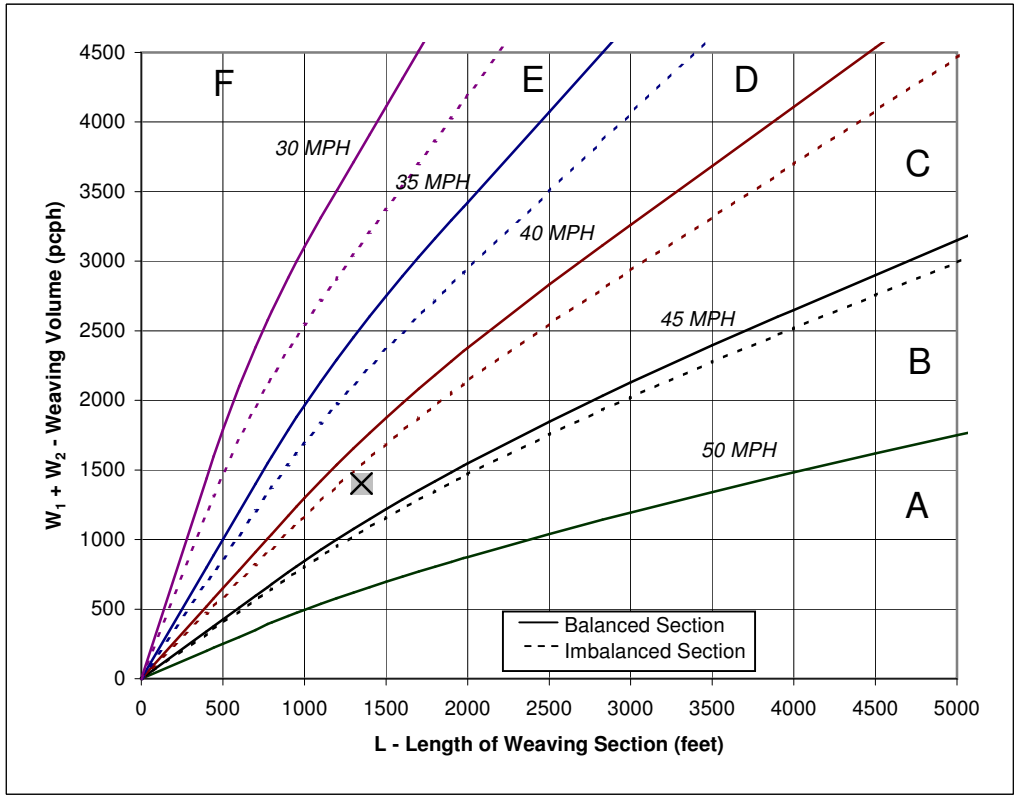
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

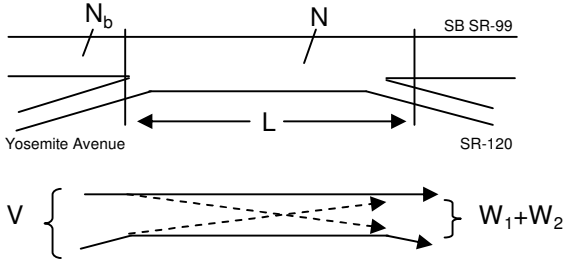
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,235	Volume (vph)*	796	Volume (vph)*	550
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,461	Volume (pcph)	836	Volume (pcph)	567

Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - AM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **41.4**
4. Weaving Intensity Factor (k) **2.40**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,418**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour AM

Major Street Airport Way
Minor Street Wawona Street

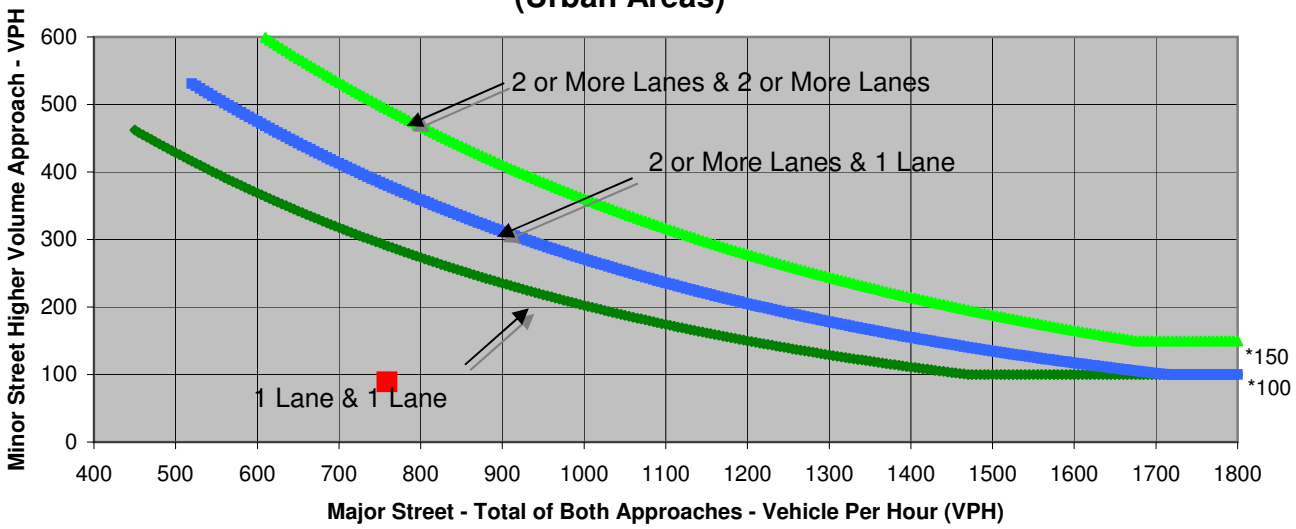
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	39	0	49
Through	320	320	0	0
Right	80	0	0	40
Total	400	359	0	89

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	759	89	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour AM

Major Street Airport Way
Minor Street Woodward Avenue

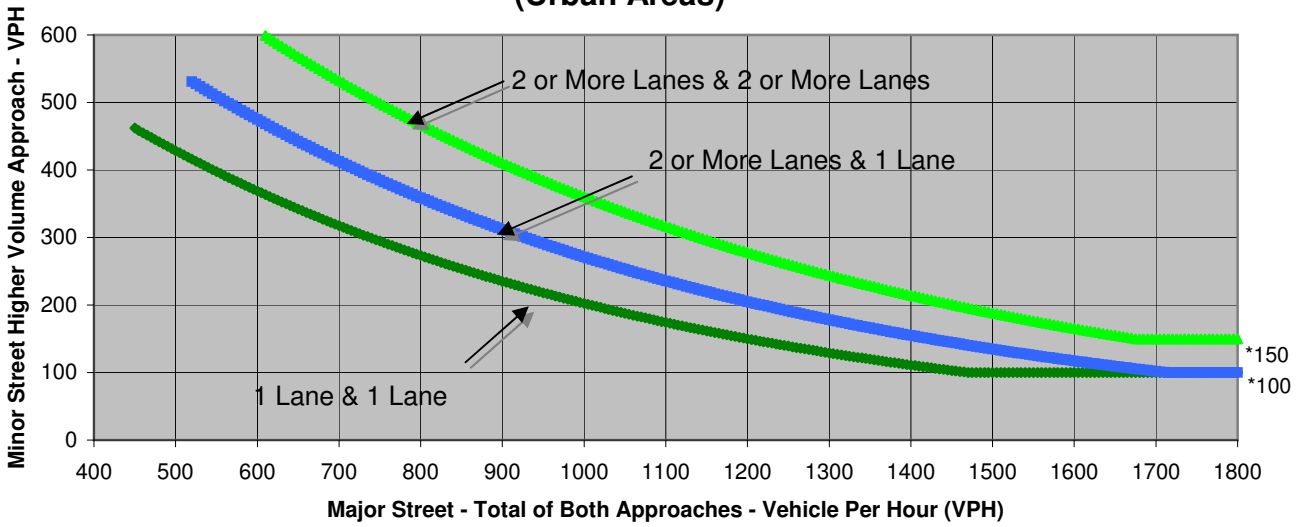
Turn Movement Volumes

	NB	SB	EB	WB
Left	13	30	45	1
Through	121	70	18	15
Right	3	38	19	22
Total	137	138	82	38

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	275	82	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour AM

Major Street Main Street
Minor Street Woodward Avenue

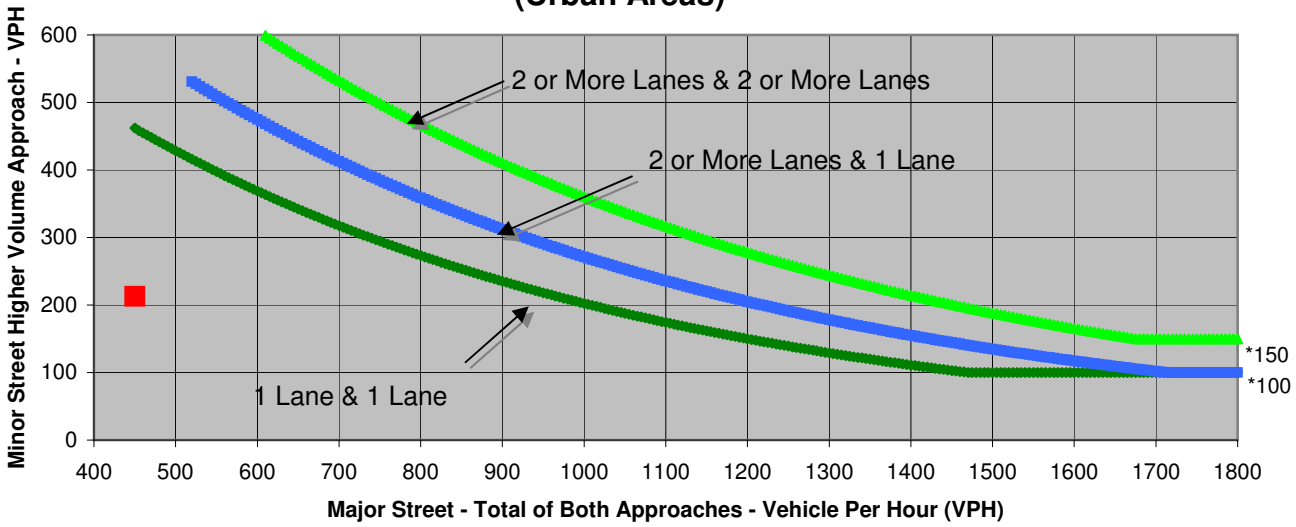
Turn Movement Volumes

	NB	SB	EB	WB
Left	34	53	18	7
Through	233	84	44	69
Right	12	34	27	137
Total	279	171	89	213

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	2	NO
Traffic Volume (VPH) *	450	213	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour AM

Major Street Union Road
Minor Street Atherton Drive

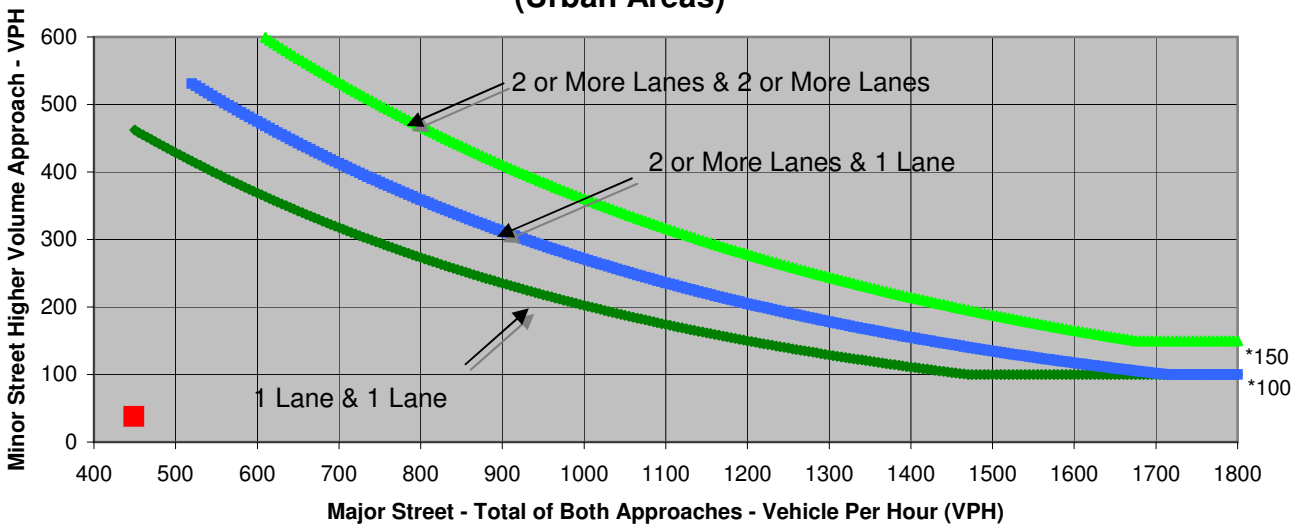
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	38	0	0
Through	227	182	0	0
Right	2	0	0	38
Total	229	220	0	38

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	NO
Traffic Volume (VPH) *	449	38	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour AM

Major Street Union Road
Minor Street Daniels Street

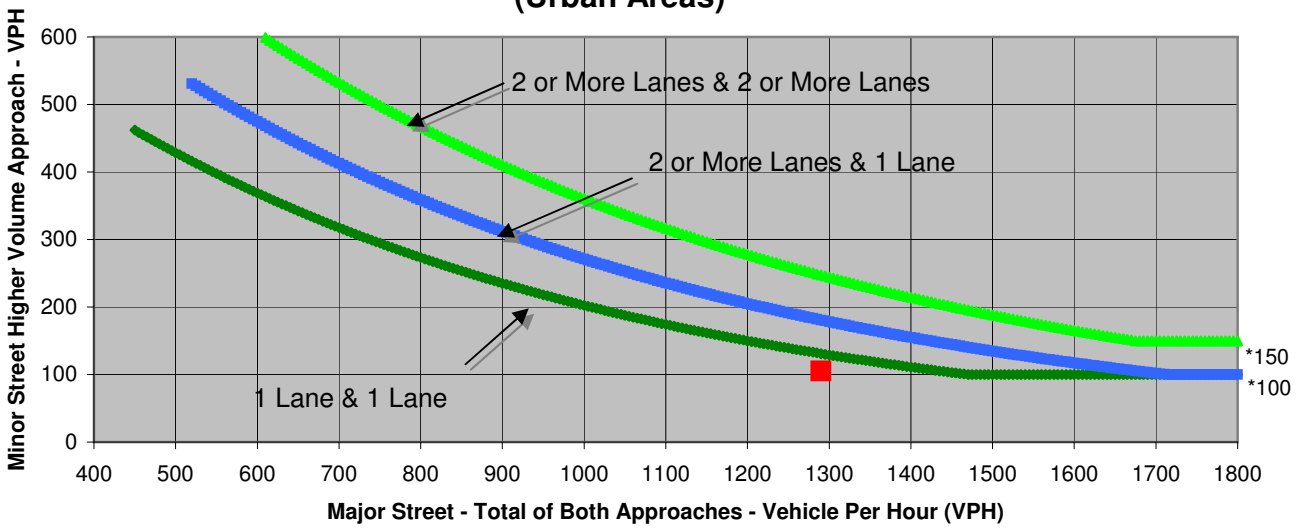
Turn Movement Volumes

	NB	SB	EB	WB
Left	45	0	35	0
Through	525	695	0	0
Right	0	25	70	0
Total	570	720	105	0

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Daniels Street	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	1,290	105	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	SR 120 EB

Project	Union Crossing
Scenario	Existing No Project
Peak Hour	AM

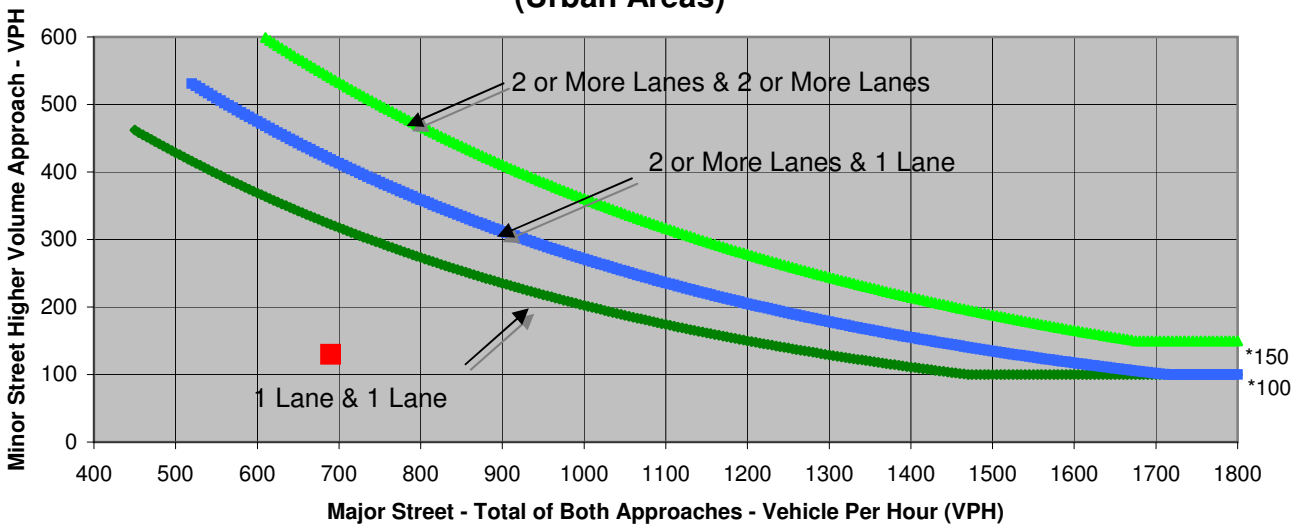
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	215	120	0
Through	235	210	0	0
Right	30	0	10	0
Total	265	425	130	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	SR 120 EB	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	690	130	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour AM

Major Street Union Road
Minor Street SR 120 WB

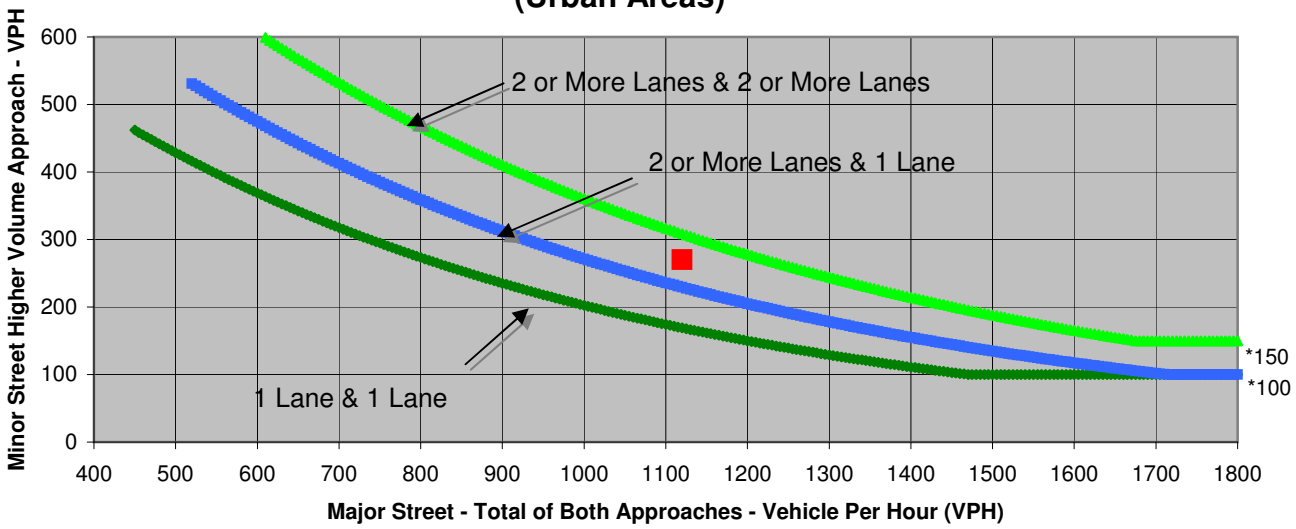
Turn Movement Volumes

	NB	SB	EB	WB
Left	30	0	0	25
Through	325	400	0	0
Right	0	365	0	245
Total	355	765	0	270

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	SR 120 WB	
Number of Approach Lanes	2	2	NO
Traffic Volume (VPH) *	1,120	270	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Existing No Project
Peak Hour	AM

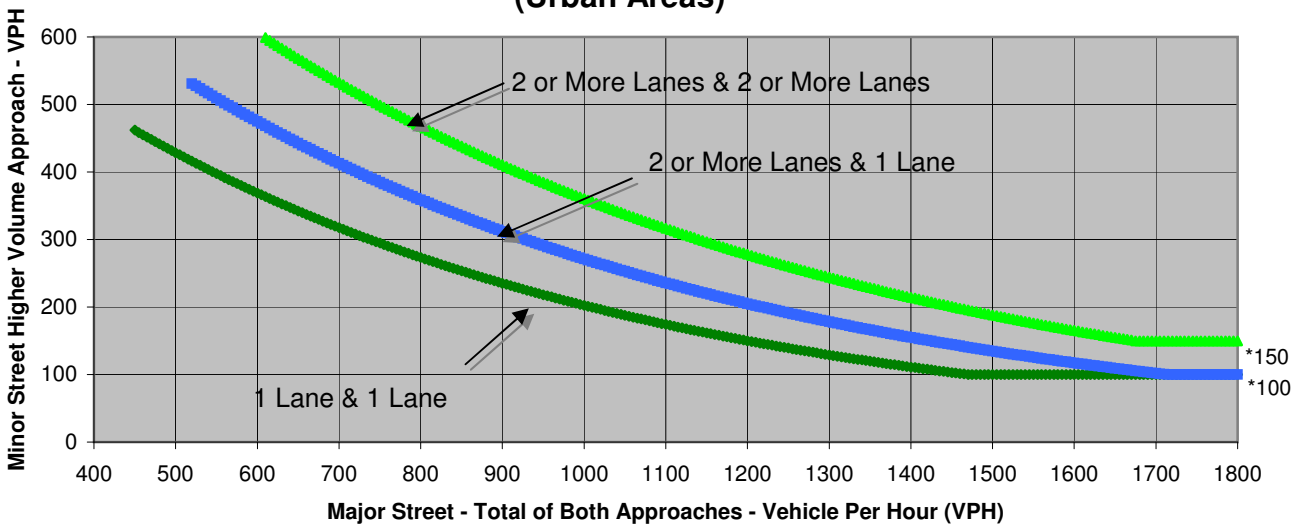
Turn Movement Volumes

	NB	SB	EB	WB
Left	2	28	7	36
Through	169	150	41	35
Right	28	4	4	53
Total	199	182	52	124

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	2	2	NO
Traffic Volume (VPH) *	381	124	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour AM

Major Street Airport Way
Minor Street SR 120 EB

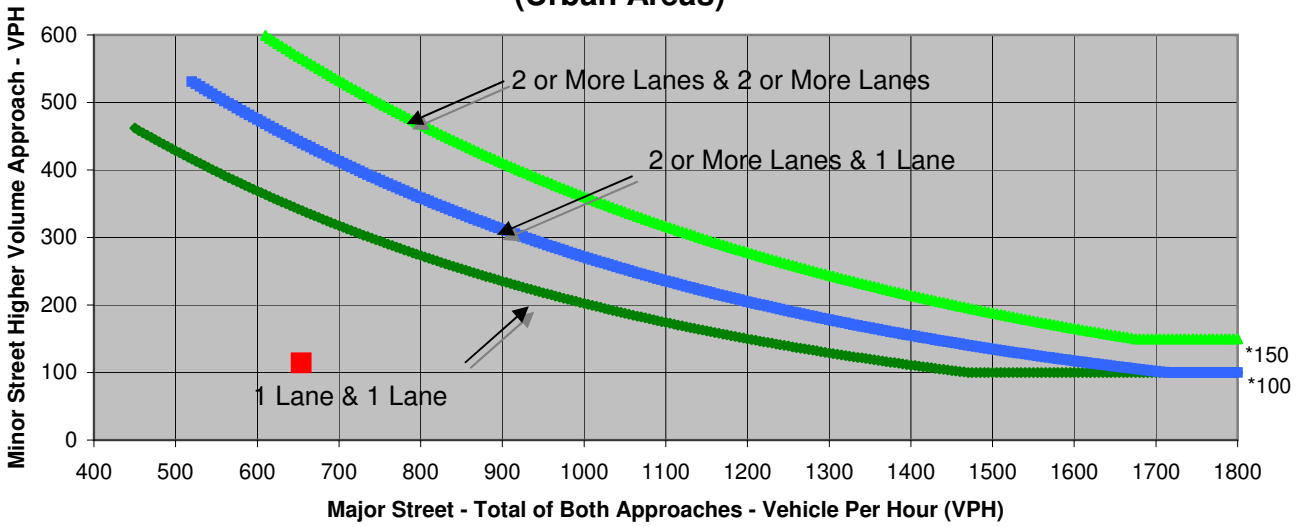
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	100	104	0
Through	323	139	0	0
Right	92	0	10	0
Total	415	239	114	0

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 EB	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	654	114	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 120 WB
Project	Union Crossing
Scenario	Existing No Project
Peak Hour	AM

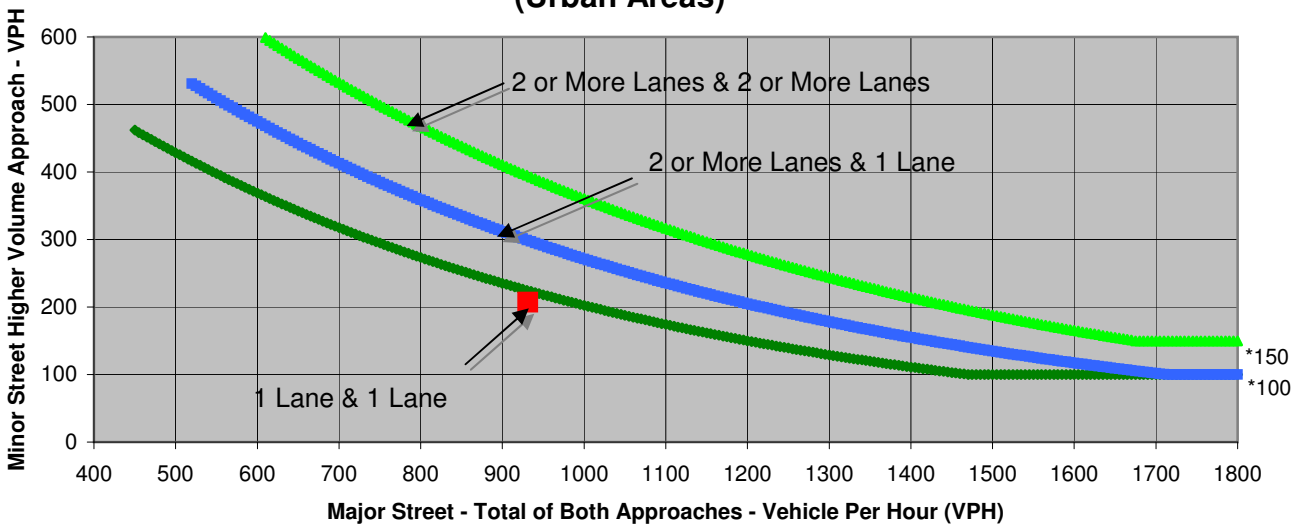
Turn Movement Volumes

	NB	SB	EB	WB
Left	109	0	0	30
Through	318	209	0	0
Right	0	295	0	177
Total	427	504	0	207

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

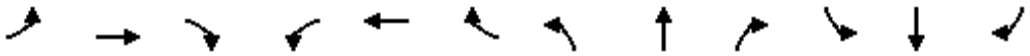


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 WB	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	931	207	

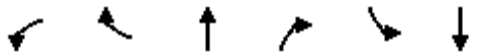
* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.93		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3494		1770	3283		1770	1827	1583	1770	1788	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3494		1770	3283		1770	1827	1583	1770	1788	
Volume (vph)	37	219	20	101	157	147	69	197	94	205	238	47
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	40	238	22	110	171	160	77	219	104	216	251	49
RTOR Reduction (vph)	0	7	0	0	129	0	0	0	64	0	5	0
Lane Group Flow (vph)	40	253	0	110	202	0	77	219	40	216	295	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	4.6	12.3		8.7	16.4		7.4	33.2	33.2	15.1	40.9	
Effective Green, g (s)	4.6	12.3		8.7	16.4		7.4	33.2	33.2	15.1	40.9	
Actuated g/C Ratio	0.05	0.14		0.10	0.19		0.09	0.39	0.39	0.18	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	95	504		181	631		154	711	616	313	857	
v/s Ratio Prot	0.02	c0.07		c0.06	0.06		0.04	0.12		c0.12	c0.16	
v/s Ratio Perm									0.03			
v/c Ratio	0.42	0.50		0.61	0.32		0.50	0.31	0.07	0.69	0.34	
Uniform Delay, d1	39.1	33.7		36.7	29.6		37.2	18.1	16.3	32.9	13.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.8		5.7	0.3		2.5	1.1	0.2	6.4	1.1	
Delay (s)	42.1	34.5		42.3	29.9		39.7	19.2	16.5	39.3	14.9	
Level of Service	D	C		D	C		D	B	B	D	B	
Approach Delay (s)		35.5			33.0			22.5			25.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	85.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

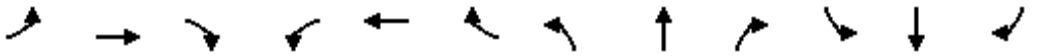
c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	49	40	320	80	39	320
Peak Hour Factor	0.85	0.85	0.90	0.90	0.95	0.95
Hourly flow rate (vph)	58	47	356	89	41	337
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.88	0.88			0.88	
vC, conflicting volume	821	404			446	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	797	323			372	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	93			96	
cM capacity (veh/h)	300	630			1044	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	105	444	378
Volume Left	58	0	41
Volume Right	47	89	0
cSH	393	1700	1044
Volume to Capacity	0.27	0.26	0.04
Queue Length 95th (ft)	26	0	3
Control Delay (s)	17.5	0.0	1.3
Lane LOS	C		A
Approach Delay (s)	17.5	0.0	1.3
Approach LOS	C		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1561	1770	1863	1562	1770	3471	1548	1770	1827	1548
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1561	1770	1863	1562	1770	3471	1548	1770	1827	1548
Volume (vph)	27	9	67	141	25	16	68	357	70	9	296	64
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	32	11	79	166	29	19	76	397	78	9	312	67
RTOR Reduction (vph)	0	0	58	0	0	14	0	0	48	0	0	47
Lane Group Flow (vph)	32	11	21	166	29	5	76	397	30	9	312	20
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		pm+ov	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.8	10.6	16.5	11.1	14.9	14.9	5.9	23.6	23.6	0.7	18.4	18.4
Effective Green, g (s)	6.8	10.6	16.5	11.1	14.9	14.9	5.9	23.6	23.6	0.7	18.4	18.4
Actuated g/C Ratio	0.11	0.17	0.27	0.18	0.24	0.24	0.10	0.38	0.38	0.01	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	377	319	516	317	448	375	168	1321	589	20	542	459
v/s Ratio Prot	0.01	0.01	0.00	c0.09	c0.02		c0.04	0.11		0.01	c0.17	
v/s Ratio Perm			0.01			0.00			0.02			0.01
v/c Ratio	0.08	0.03	0.04	0.52	0.06	0.01	0.45	0.30	0.05	0.45	0.58	0.04
Uniform Delay, d1	24.8	21.4	16.9	23.1	18.2	17.9	26.5	13.4	12.1	30.5	18.5	15.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.01	0.99	0.93	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	0.0	1.6	0.1	0.0	1.9	0.1	0.0	15.3	1.5	0.0
Delay (s)	24.9	21.5	16.9	24.6	18.2	18.0	28.7	13.4	11.3	45.7	20.0	15.6
Level of Service	C	C	B	C	B	B	C	B	B	D	B	B
Approach Delay (s)		19.4			23.2			15.2			19.8	
Approach LOS		B			C			B			B	

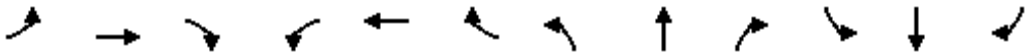
Intersection Summary			
HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	30	0	177	109	318	0	0	209	295
Peak Hour Factor	0.25	0.25	0.25	0.65	0.65	0.65	0.80	0.80	0.80	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	46	0	272	136	398	0	0	232	328
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											494	
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	1338	1066	396	1066	1230	398	560			398		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1393	1077	298	1077	1267	398	489			398		
tC, single (s)	7.1	6.5	6.2	*6.4	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	75	100	57	85			100		
cM capacity (veh/h)	53	161	638	186	124	639	925			1161		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	318	136	398	560
Volume Left	46	136	0	0
Volume Right	272	0	0	328
cSH	473	925	1700	1700
Volume to Capacity	0.67	0.15	0.23	0.33
Queue Length 95th (ft)	123	13	0	0
Control Delay (s)	27.0	9.6	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	27.0	2.4		0.0
Approach LOS	D			

Intersection Summary				
Average Delay	7.0			
Intersection Capacity Utilization	57.7%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value

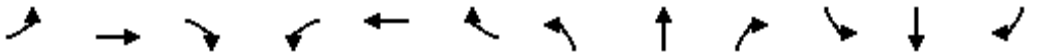


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	104	0	10	0	0	0	0	323	92	100	139	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.80	0.80	0.80
Hourly flow rate (vph)	116	0	11	0	0	0	0	359	102	125	174	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	834	885	174	845	834	410	174			461		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	834	885	174	845	834	410	174			461		
tC, single (s)	*6.5	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	61	100	99	100	100	100	100			88		
cM capacity (veh/h)	299	251	870	254	269	642	1403			1069		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	127	461	125	174
Volume Left	116	0	125	0
Volume Right	11	102	0	0
cSH	318	1700	1069	1700
Volume to Capacity	0.40	0.27	0.12	0.10
Queue Length 95th (ft)	46	0	10	0
Control Delay (s)	23.7	0.0	8.8	0.0
Lane LOS	C		A	
Approach Delay (s)	23.7	0.0	3.7	
Approach LOS	C			

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	57.7%	ICU Level of Service	B	
Analysis Period (min)	15			

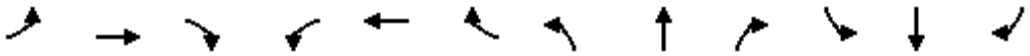
* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	147	2	3	3	1	87	5	181	2	22	101	26
Peak Hour Factor	0.85	0.85	0.85	0.75	0.75	0.75	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	173	2	4	4	1	116	6	226	2	28	126	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	479	422	126	423	452	226	159			229		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	479	422	126	423	452	226	159			229		
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 %	59	100	100	99	100	86	100			98		
cM capacity (veh/h)	417	510	924	527	490	813	1421			1339		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	179	4	117	6	226	2	28	126	32
Volume Left	173	4	0	6	0	0	28	0	0
Volume Right	4	0	116	0	0	2	0	0	32
cSH	427	527	822	1421	1700	1700	1339	1700	1700
Volume to Capacity	0.42	0.01	0.14	0.00	0.13	0.00	0.02	0.07	0.02
Queue Length 95th (ft)	51	1	12	0	0	0	2	0	0
Control Delay (s)	19.4	11.9	10.2	7.5	0.0	0.0	7.7	0.0	0.0
Lane LOS	C	B	B	A			A		
Approach Delay (s)	19.4	10.2		0.2			1.1		
Approach LOS	C	B							

Intersection Summary				
Average Delay	6.9			
Intersection Capacity Utilization	37.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	18	19	1	15	22	13	121	3	30	70	38
Peak Hour Factor	0.60	0.60	0.60	0.65	0.65	0.65	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	75	30	32	2	23	34	15	142	4	35	82	45

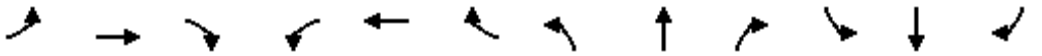
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	137	58	161	162
Volume Left (vph)	75	2	15	35
Volume Right (vph)	32	34	4	45
Hadj (s)	0.00	-0.31	0.04	-0.09
Departure Headway (s)	4.7	4.5	4.6	4.5
Degree Utilization, x	0.18	0.07	0.21	0.20
Capacity (veh/h)	704	723	741	757
Control Delay (s)	8.8	7.9	8.8	8.6
Approach Delay (s)	8.8	7.9	8.8	8.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.6		
HCM Level of Service	A		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3391		1770	3296		1770	3323	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3391		1770	3296		1770	3323	
Volume (vph)	121	163	112	53	169	65	154	293	50	67	303	209
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	132	177	122	58	184	71	181	345	59	74	337	232
RTOR Reduction (vph)	0	0	96	0	57	0	0	14	0	0	131	0
Lane Group Flow (vph)	132	177	26	58	198	0	181	390	0	74	438	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.3	15.2	15.2	3.3	11.2		9.0	31.1		4.4	26.5	
Effective Green, g (s)	7.3	15.2	15.2	3.3	11.2		9.0	31.1		4.4	26.5	
Actuated g/C Ratio	0.10	0.22	0.22	0.05	0.16		0.13	0.44		0.06	0.38	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	405	344	83	543		228	1464		111	1258	
v/s Ratio Prot	c0.07	c0.10		0.03	0.06		c0.10	0.12		0.04	c0.13	
v/s Ratio Perm			0.02									
v/c Ratio	0.71	0.44	0.08	0.70	0.36		0.79	0.27		0.67	0.35	
Uniform Delay, d1	30.3	23.7	21.8	32.9	26.2		29.6	12.3		32.1	15.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.3	0.8	0.1	22.6	0.4		17.1	0.4		14.1	0.8	
Delay (s)	42.6	24.5	21.9	55.5	26.6		46.7	12.7		46.2	16.3	
Level of Service	D	C	C	E	C		D	B		D	B	
Approach Delay (s)		29.3			32.0			23.2			19.8	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

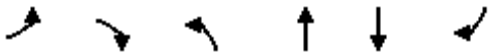
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.93		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1691		1770	1737		1770	3308		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1691		1770	1737		1770	3308		1770	1863	1583
Volume (vph)	55	75	120	145	85	70	80	412	50	75	442	10
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	65	88	141	171	100	82	94	485	59	83	491	11
RTOR Reduction (vph)	0	97	0	0	47	0	0	11	0	0	0	10
Lane Group Flow (vph)	65	132	0	171	135	0	94	533	0	83	491	1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	3.4	10.0		7.1	13.7		4.7	25.8		4.5	25.6	3.4
Effective Green, g (s)	3.4	10.0		7.1	13.7		4.7	25.8		4.5	25.6	3.4
Actuated g/C Ratio	0.05	0.16		0.11	0.22		0.07	0.41		0.07	0.40	0.05
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	95	267		198	375		131	1346		126	752	85
v/s Ratio Prot	0.04	c0.08		c0.10	c0.08		c0.05	0.16		0.05	c0.26	0.00
v/s Ratio Perm												
v/c Ratio	0.68	0.49		0.86	0.36		0.72	0.40		0.66	0.65	0.01
Uniform Delay, d1	29.5	24.4		27.7	21.1		28.7	13.3		28.7	15.3	28.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Incremental Delay, d2	18.5	1.4		30.0	0.6		17.1	0.9		11.8	4.4	0.0
Delay (s)	47.9	25.8		57.7	21.7		45.8	14.1		40.5	19.7	28.4
Level of Service	D	C		E	C		D	B		D	B	C
Approach Delay (s)		30.7			39.1			18.7			22.8	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

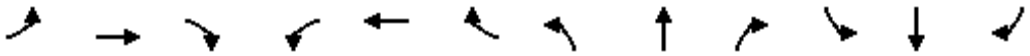
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	35	70	45	525	695	25
Peak Hour Factor	0.92	0.92	0.85	0.85	0.90	0.90
Hourly flow rate (vph)	38	76	53	618	772	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1510	786	800			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1510	786	800			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	69	81	94			
cM capacity (veh/h)	124	392	823			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	114	671	800
Volume Left	38	53	0
Volume Right	76	0	28
cSH	228	823	1700
Volume to Capacity	0.50	0.06	0.47
Queue Length 95th (ft)	64	5	0
Control Delay (s)	35.7	1.7	0.0
Lane LOS	E	A	
Approach Delay (s)	35.7	1.7	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

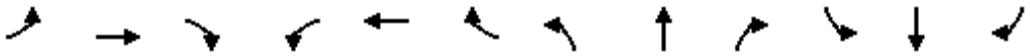


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	25	0	245	30	325	0	0	400	365
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	28	0	272	35	382	0	0	444	406
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1372	1100	647	1100	1303	382	850			382		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1372	1100	647	1100	1303	382	850			382		
tC, single (s)	7.1	6.5	6.2	*6.5	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	87	100	59	96			100		
cM capacity (veh/h)	70	203	471	219	153	665	788			1176		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	28	272	35	382	850
Volume Left	28	0	35	0	0
Volume Right	0	272	0	0	406
cSH	219	665	788	1700	1700
Volume to Capacity	0.13	0.41	0.04	0.22	0.50
Queue Length 95th (ft)	11	50	4	0	0
Control Delay (s)	23.8	14.1	9.8	0.0	0.0
Lane LOS	C	B	A		
Approach Delay (s)	15.0		0.8		0.0
Approach LOS	C				

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	60.0%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	120	0	10	0	0	0	0	235	30	215	210	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85
Hourly flow rate (vph)	133	0	11	0	0	0	0	261	33	253	247	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1031	1047	247	1042	1031	278	247			294		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1031	1047	247	1042	1031	278	247			294		
tC, single (s)	*6.4	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	39	100	99	100	100	100	100			80		
cM capacity (veh/h)	220	182	777	173	187	761	1319			1267		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	144	294	253	247
Volume Left	133	0	253	0
Volume Right	11	33	0	0
cSH	233	1700	1267	1700
Volume to Capacity	0.62	0.17	0.20	0.15
Queue Length 95th (ft)	92	0	19	0
Control Delay (s)	42.8	0.0	8.5	0.0
Lane LOS	E		A	
Approach Delay (s)	42.8	0.0	4.3	
Approach LOS	E			

Intersection Summary				
Average Delay	8.9			
Intersection Capacity Utilization	60.0%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	38	227	2	38	182
Peak Hour Factor	0.80	0.80	0.70	0.70	0.80	0.80
Hourly flow rate (vph)	0	48	324	3	48	228
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	648	326			327	
vC1, stage 1 conf vol	326					
vC2, stage 2 conf vol	322					
vCu, unblocked vol	648	326			327	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			96	
cM capacity (veh/h)	519	715			1232	

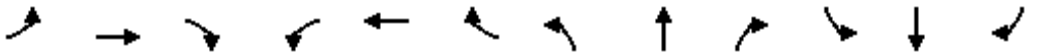
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	0	48	327	48	228
Volume Left	0	0	0	48	0
Volume Right	0	48	3	0	0
cSH	1700	715	1700	1232	1700
Volume to Capacity	0.00	0.07	0.19	0.04	0.13
Queue Length 95th (ft)	0	5	0	3	0
Control Delay (s)	0.0	10.4	0.0	8.0	0.0
Lane LOS	A	B		A	
Approach Delay (s)	10.4		0.0	1.4	
Approach LOS	B				

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection has too many lanes per leg.

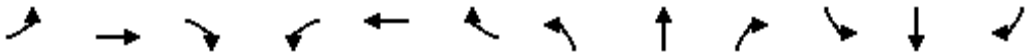
HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1491
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1491
Volume (vph)	0	0	0	30	0	209	185	406	0	0	231	264
Peak-hour factor, PHF	0.25	0.25	0.25	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	33	0	232	206	451	0	0	257	293
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	146
Lane Group Flow (vph)	0	0	0	0	33	232	206	451	0	0	257	147
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					1.1	47.3	10.4	38.2			23.8	23.8
Effective Green, g (s)					1.1	47.3	10.4	38.2			23.8	23.8
Actuated g/C Ratio					0.02	1.00	0.22	0.81			0.50	0.50
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					40	1492	382	1447			902	750
v/s Ratio Prot					c0.02		c0.12	c0.25			0.14	
v/s Ratio Perm						0.16						0.10
v/c Ratio					0.82	0.16	0.54	0.31			0.28	0.20
Uniform Delay, d1					23.0	0.0	16.3	1.2			6.8	6.5
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					76.6	0.2	1.5	0.1			0.2	0.1
Delay (s)					99.6	0.2	17.8	1.3			7.0	6.6
Level of Service					F	A	B	A			A	A
Approach Delay (s)		0.0			12.6			6.5			6.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	47.3	Sum of lost time (s)	8.0
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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1515					1799		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1515					1799		1703	1827	
Volume (vph)	240	0	52	0	0	0	0	351	37	142	119	0
Peak-hour factor, PHF	0.80	0.80	0.80	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Adj. Flow (vph)	300	0	65	0	0	0	0	369	39	167	140	0
RTOR Reduction (vph)	0	0	51	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	300	14	0	0	0	0	405	0	167	140	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		13.0	13.0					25.4		9.2	38.6	
Effective Green, g (s)		13.0	13.0					25.4		9.2	38.6	
Actuated g/C Ratio		0.22	0.22					0.43		0.15	0.65	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		371	330					767		263	1183	
v/s Ratio Prot		c0.18						c0.23		c0.10	0.08	
v/s Ratio Perm			0.01									
v/c Ratio		0.81	0.04					0.53		0.63	0.12	
Uniform Delay, d1		22.1	18.4					12.7		23.6	4.0	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		12.2	0.1					0.7		4.9	0.0	
Delay (s)		34.3	18.4					13.3		28.6	4.1	
Level of Service		C	B					B		C	A	
Approach Delay (s)		31.5			0.0			13.3			17.4	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	59.6	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												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	0	0	388	0	0	171	0
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	0	0	0	0	408	0	0	201	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked												
vC, conflicting volume	610	610	201	610	610	408	201			408		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	610	610	201	610	610	408	201			408		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	407	409	840	407	409	643	1371			1150		

Direction, Lane #	NB 1	SB 1
Volume Total	408	201
Volume Left	0	0
Volume Right	0	0
cSH	1371	1150
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec):	100	Critical Vol./Cap.(X):	0.265
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	9.3
Optimal Cycle:	0	Level Of Service:	A

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	2	169	28	28	150	4	7	41	4	36	35	53
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	2	169	28	28	150	4	7	41	4	36	35	53
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	2	169	28	28	150	4	7	41	4	36	35	53
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	2	169	28	28	150	4	7	41	4	36	35	53
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	2	169	28	28	150	4	7	41	4	36	35	53
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	2	169	28	28	150	4	7	41	4	36	35	53
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	583	638	725	580	634	719	530	573	643	548	592	671
Capacity Analysis Module:												
Vol/Sat:	0.00	0.26	0.04	0.05	0.24	0.01	0.01	0.07	0.01	0.07	0.06	0.08
Crit Moves:		****			****			****				****
Delay/Veh:	8.6	10.0	7.6	8.9	9.8	7.5	9.1	9.0	7.9	9.3	8.7	8.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.6	10.0	7.6	8.9	9.8	7.5	9.1	9.0	7.9	9.3	8.7	8.1
LOS by Move:	A	A	A	A	A	A	A	A	A	A	A	A
ApproachDel:		9.6			9.6			8.9			8.6	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		9.6			9.6			8.9			8.6	
LOS by Appr:		A			A			A			A	
AllWayAvgQ:	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.1	0.1	0.1

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #14

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.55			0.54			0.43			0.48		
P[C2]:	0.20			0.21			0.09			0.04		
P[C3]:	0.17			0.17			0.33			0.37		
P[C4]:	0.07			0.08			0.13			0.10		
P[C5]:	0.00			0.00			0.01			0.01		
Padj[C1]:	0.008			0.008			0.012			0.011		
Padj[C2]:	0.001			0.001			0.005			0.005		
Padj[C3]:	-0.004			-0.004			-0.008			-0.010		
Padj[C4]:	-0.004			-0.005			-0.008			-0.006		
Padj[C5]:	-0.000			-0.000			-0.001			-0.001		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	2	28		28	4		7	4		36	53	
Capacity:	583	725		580	719		530	643		548	671	
DegOfUtil:	0.00	0.04		0.05	0.01		0.01	0.01		0.06	0.07	
DepHeadway:	5.93	4.73		5.95	4.75		6.35	5.15		6.21	5.01	
ServiceTime:	3.6	2.4		3.7	2.5		4.1	2.9		3.9	2.7	
Delay:	8.6	7.6		8.9	7.5		9.1	7.9		9.3	8.1	
Queue:	0.0	0.0		0.0	0.0		0.0	0.0		0.1	0.1	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	169			150			41			35		
Capacity:	638			634			573			592		
DegOfUtil:	0.25			0.23			0.07			0.06		
DepHeadway:	5.43			5.45			5.85			5.71		
ServiceTime:	3.1			3.2			3.6			3.4		
Delay:	10.0			9.8			9.0			8.7		
Queue:	0.3			0.3			0.1			0.1		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	9.6			9.6			8.9			8.6		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.6			9.6			8.9			8.6		
LOS by Appr:	A			A			A			A		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	9.3
OverallLOS:	A

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	2	169	28	28	150	4	7	41	4	36	35	53

Major Street Volume: 381
Minor Approach Volume: 124
Minor Approach Volume Threshold: 789

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec): 100 | Critical Vol./Cap.(X): 0.391
Loss Time (sec): 0 (Y+R=4.0 sec) | Average Delay (sec/veh): 10.2
Optimal Cycle: 0 | Level Of Service: B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	34	233	12	53	84	34	18	44	27	7	69	137
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	34	233	12	53	84	34	18	44	27	7	69	137
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	34	233	12	53	84	34	18	44	27	7	69	137
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	34	233	12	53	84	34	18	44	27	7	69	137
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	34	233	12	53	84	34	18	44	27	7	69	137
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	34	233	12	53	84	34	18	44	27	7	69	137
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	546	596	666	520	562	629	492	528	587	516	558	629
Capacity Analysis Module:												
Vol/Sat:	0.06	0.39	0.02	0.10	0.15	0.05	0.04	0.08	0.05	0.01	0.12	0.22
Crit Moves:		****			****			****				****
Delay/Veh:	9.4	12.0	7.9	9.9	9.7	8.3	9.8	9.5	8.6	9.4	9.6	9.4
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.4	12.0	7.9	9.9	9.7	8.3	9.8	9.5	8.6	9.4	9.6	9.4
LOS by Move:	A	B	A	A	A	A	A	A	A	A	A	A
ApproachDel:		11.5			9.5			9.3			9.5	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		11.5			9.5			9.3			9.5	
LOS by Appr:		B			A			A			A	
AllWayAvgQ:	0.1	0.6	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.2

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #18

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.44			0.34			0.30			0.36		
P[C2]:	0.16			0.25			0.13			0.06		
P[C3]:	0.27			0.21			0.32			0.40		
P[C4]:	0.13			0.18			0.22			0.16		
P[C5]:	0.01			0.02			0.03			0.02		
Padj[C1]:	0.011			0.013			0.016			0.014		
Padj[C2]:	0.004			0.004			0.007			0.007		
Padj[C3]:	-0.007			-0.004			-0.007			-0.010		
Padj[C4]:	-0.008			-0.011			-0.013			-0.010		
Padj[C5]:	-0.001			-0.002			-0.003			-0.002		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	34	12		53	34		18	27		7	137	
Capacity:	546	666		520	629		492	587		516	629	
DegOfUtil:	0.06	0.02		0.10	0.05		0.03	0.04		0.01	0.20	
DepHeadway:	6.31	5.11		6.54	5.34		6.81	5.61		6.57	5.37	
ServiceTime:	4.0	2.8		4.2	3.0		4.5	3.3		4.3	3.1	
Delay:	9.4	7.9		9.9	8.3		9.8	8.6		9.4	9.4	
Queue:	0.1	0.0		0.1	0.0		0.0	0.0		0.0	0.2	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	233			84			44			69		
Capacity:	596			562			528			558		
DegOfUtil:	0.38			0.14			0.08			0.12		
DepHeadway:	5.81			6.04			6.31			6.07		
ServiceTime:	3.5			3.7			4.0			3.8		
Delay:	12.0			9.7			9.5			9.6		
Queue:	0.6			0.2			0.1			0.1		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	11.5			9.5			9.3			9.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	11.5			9.5			9.3			9.5		
LOS by Appr:	B			A			A			A		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	10.2
OverallLOS:	B

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	34	233	12	53	84	34	18	44	27	7	69	137

Major Street Volume: 450
Minor Approach Volume: 213
Minor Approach Volume Threshold: 717

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Existing No Project PM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3252	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	884	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1829	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1829	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	2	
Density, D	28.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Airport
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Commercial EIR

Flow Inputs and Adjustments

Volume, V	3177	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	863	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1813	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1813	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.8	mi/h
Number of lanes, N	2	
Density, D	28.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2970	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	807	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1695	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1695	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	26.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2730	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	742	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1558	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1558	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.0	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2382	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	647	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1359	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1359	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2277	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	619	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1299	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1299	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.0	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2445	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	664	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1395	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1395	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2260	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	614	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1290	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1290	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2182	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	593	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1245	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1245	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2262	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	602	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1245	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1245	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4846	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1275	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1819	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1819	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	3	
Density, D	28.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to Lathrop
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2955	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	778	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1664	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1664	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	25.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Lathrop to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2930	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	771	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1650	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1650	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	25.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4650	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1224	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1746	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1746	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.3	mi/h
Number of lanes, N	3	
Density, D	27.2	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: Existing Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4932	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1298	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1852	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1852	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.4	mi/h
Number of lanes, N	3	
Density, D	29.2	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Exisitng
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3252	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	194	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3252	194		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	884	61		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3712	249		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3712$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3712	4700	No
$v_{FO} = v - v_R$	3463	4700	No
v_R	249	2000	No

$v_{3 \text{ or } av34} = v_R$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3712	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 34.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.450$

Space mean speed in ramp influence area, $S_R = 54.6$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.6$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2716	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	254	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2716	254		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	738	69		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3100	283		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 3100$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3383	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3100	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A = 28.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_S = 0.401$

Space mean speed in ramp influence area, $S_R = 55.8$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 55.8$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Exisitng
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2970	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	495	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2970	495		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	807	155		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3390	634		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3390$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3390	4700	No
$v_{FO} = v - v_R$	2756	4700	No
v_R	634	2000	No

$v_{3 \text{ or } av34} = v_R$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3390	4600	No

!

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 32.1$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.485$

Space mean speed in ramp influence area, $S_R = 53.8$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 53.8$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2475	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	255	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2475	255		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	673	69		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2825	284		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2825$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3109	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2825	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R12} + 0.0078\, v_{RA} - 0.00627\, L_A = 26.5$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.373$

Space mean speed in ramp influence area, $S_R = 56.4$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 56.4$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Exisitng
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2445	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	350	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2445	350		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	664	92		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2790	378		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v_F - v_R) P_{FD} = 2790$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_i = v_F$	2790	4700	No
$v_o = v_F - v_R$	2412	4700	No
v_R	378	2000	No

$v_{av34} = v_3$ or v_{av34} = 0 pc/h (Equation 25-15 or 25-16)

Is $v_{av34} = v_3$ or v_{av34} > 2700 pc/h? No

Is $v_{av34} = v_3$ or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2790	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 26.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.462$

Space mean speed in ramp influence area, $S_R = 54.4$ mph

Space mean speed in outer lanes, $S_0 = N/A$ mph

Space mean speed for all vehicles, $S = 54.4$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2095	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	165	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2095	165		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	569	45		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2391	184		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2391$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2575	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\ v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2391	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{12} + 0.0078\ v_R - 0.00627\ L_A = 22.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.337$

Space mean speed in ramp influence area, $S_R = 57.2$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 57.2$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2260	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	289	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2260	289		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	614	76		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2579	312		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2579$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2579	4700	No
$v_{FO} = v - v_R$	2267	4700	No
v_R	312	2000	No

$v_{3 \text{ or } av34} = v_R$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2579	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 25.1$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.456$

Space mean speed in ramp influence area, $S_R = 54.5$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.5$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1971	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	211	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1971	211		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	536	57		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2250	235		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2250$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2485	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2250	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R12} + 0.0078\, v_{RA} - 0.00627\, L_A = 21.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.333$

Space mean speed in ramp influence area, $S_R = 57.3$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 57.3$ mph

Leisch Method for Weaving Analysis

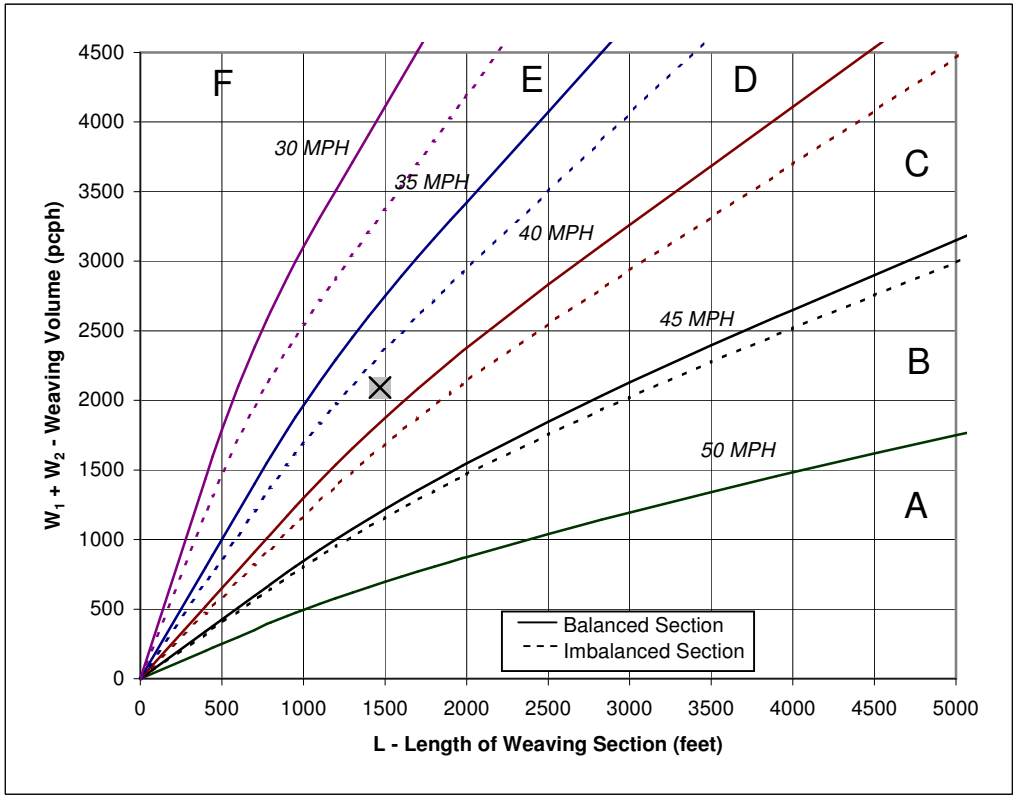
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

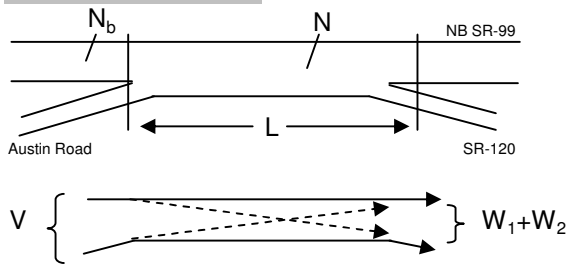
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,713	Volume (vph)*	119	Volume (vph)*	1,877
Truck Percentage	14%	Truck Percentage	6%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	5,043	Volume (pcph)	123	Volume (pcph)	1,971

Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - PM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) 38.5
4. Weaving Intensity Factor (k) 3.00
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ 1,322
6. Level of Service (LOS) C

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

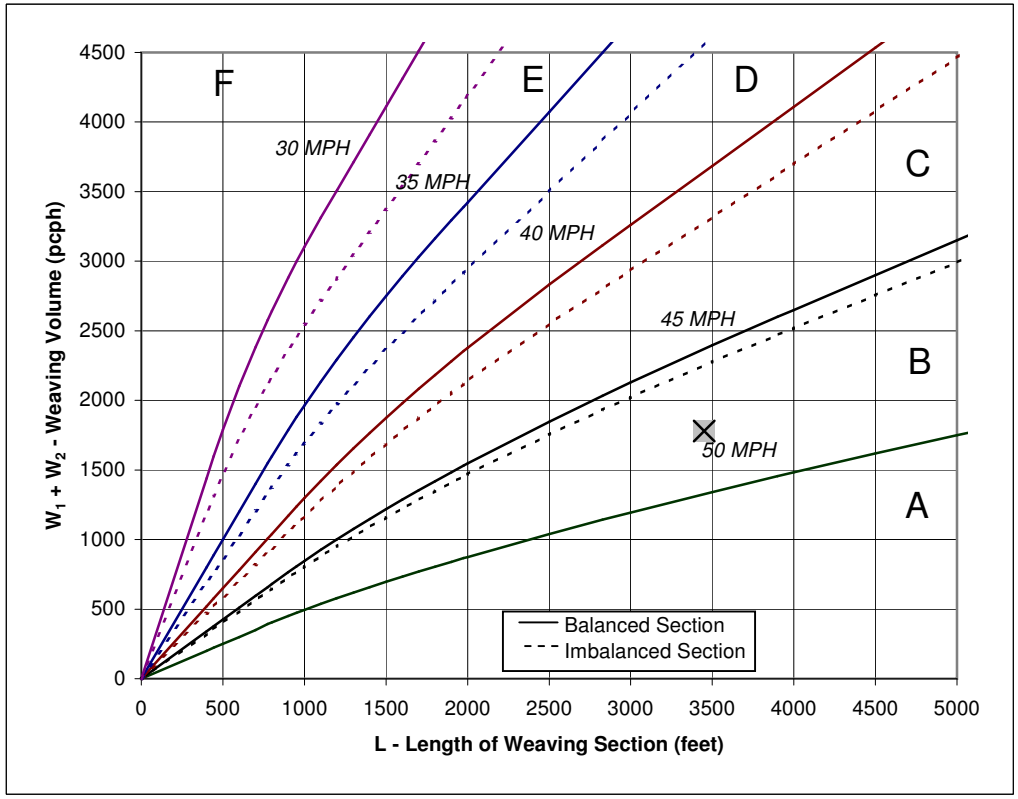
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

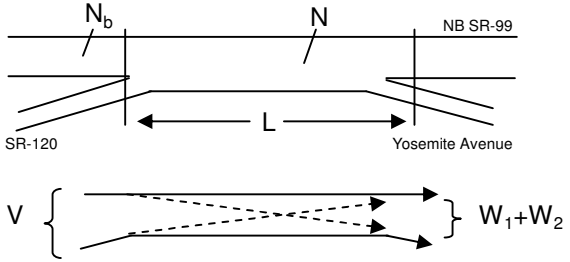
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,551	Volume (vph)*	715	Volume (vph)*	1,000
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,800	Volume (pcph)	751	Volume (pcph)	1,030

Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - PM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **47.8**
4. Weaving Intensity Factor (k) **1.55**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,405**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

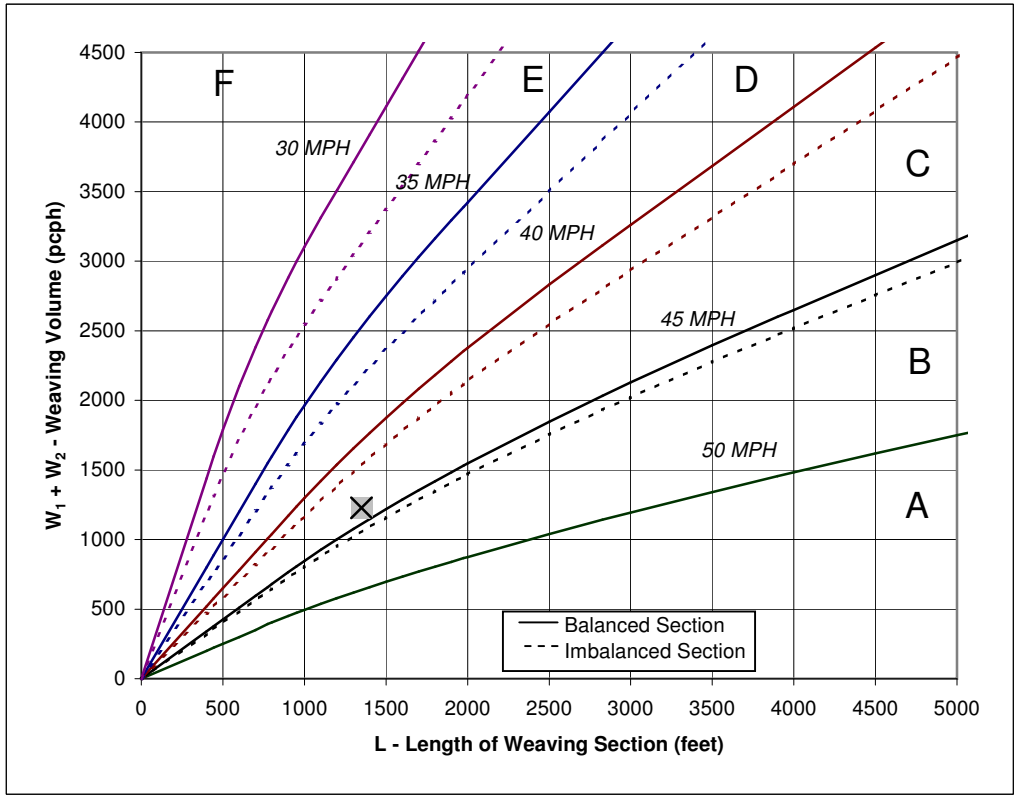
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

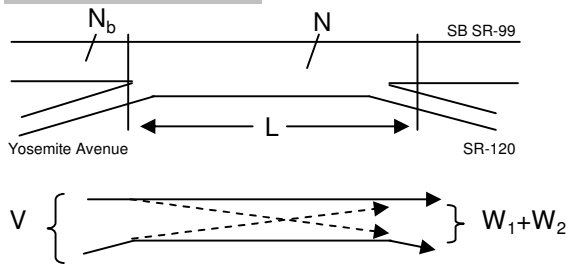
Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - PM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,383	Volume (vph)*	777	Volume (vph)*	400
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,620	Volume (pcph)	816	Volume (pcph)	412



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **43.2**
4. Weaving Intensity Factor (k) **2.20**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,371**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour PM

Major Street Union Road
Minor Street Daniels Street

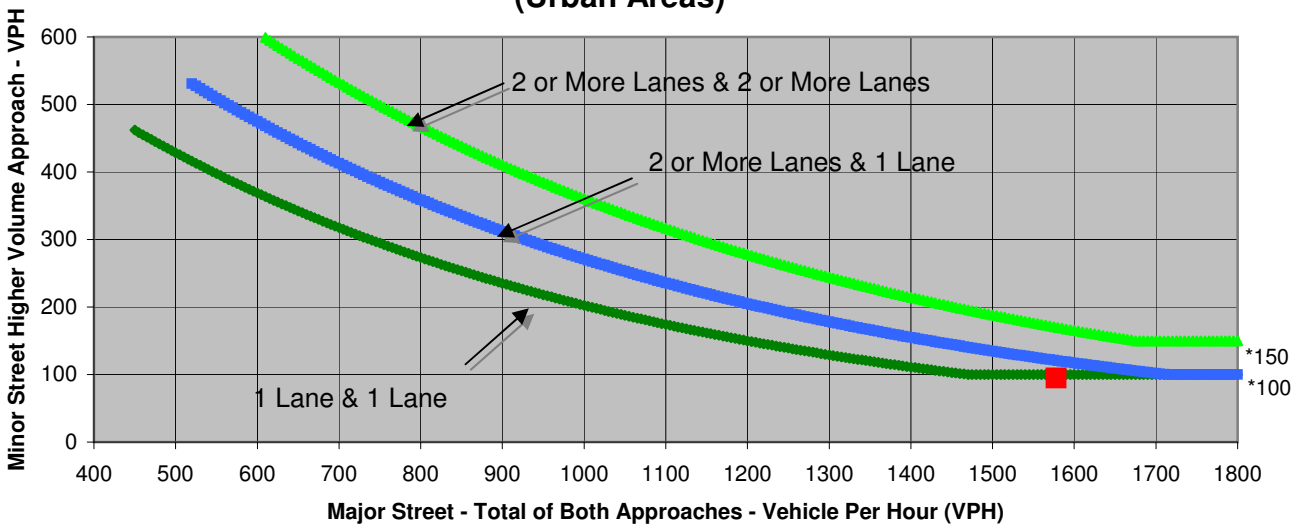
Turn Movement Volumes

	NB	SB	EB	WB
Left	80	0	0	35
Through	901	447	0	0
Right	0	150	0	60
Total	981	597	0	95

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Daniels Street	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	1,578	95	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	SR 120 EB

Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

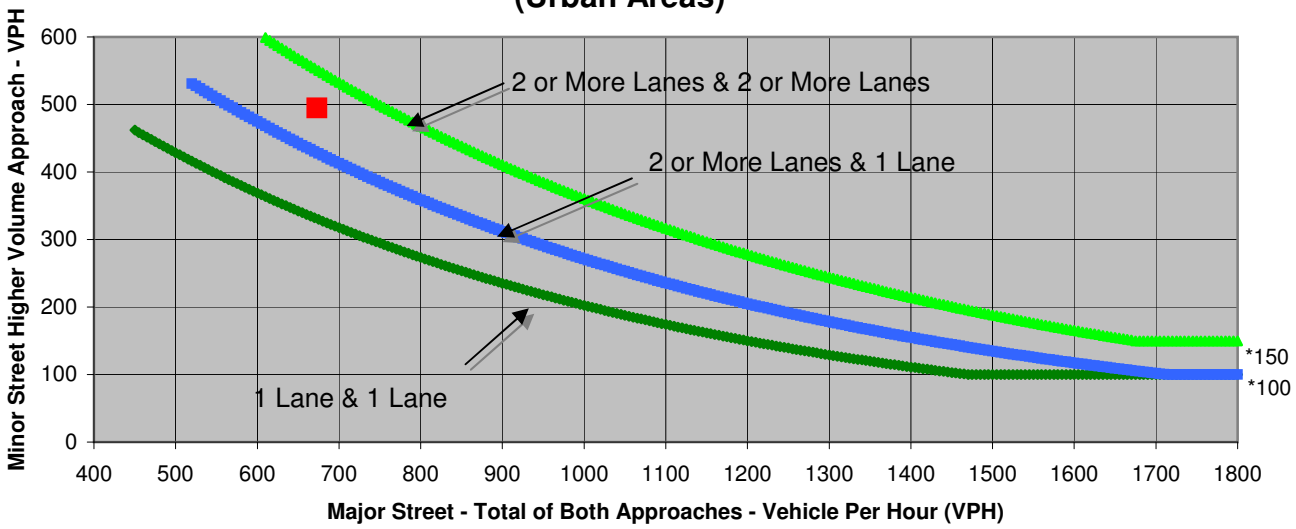
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	250	455	0
Through	206	212	0	0
Right	5	0	40	0
Total	211	462	495	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	SR 120 EB	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	673	495	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	SR 120 WB

Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

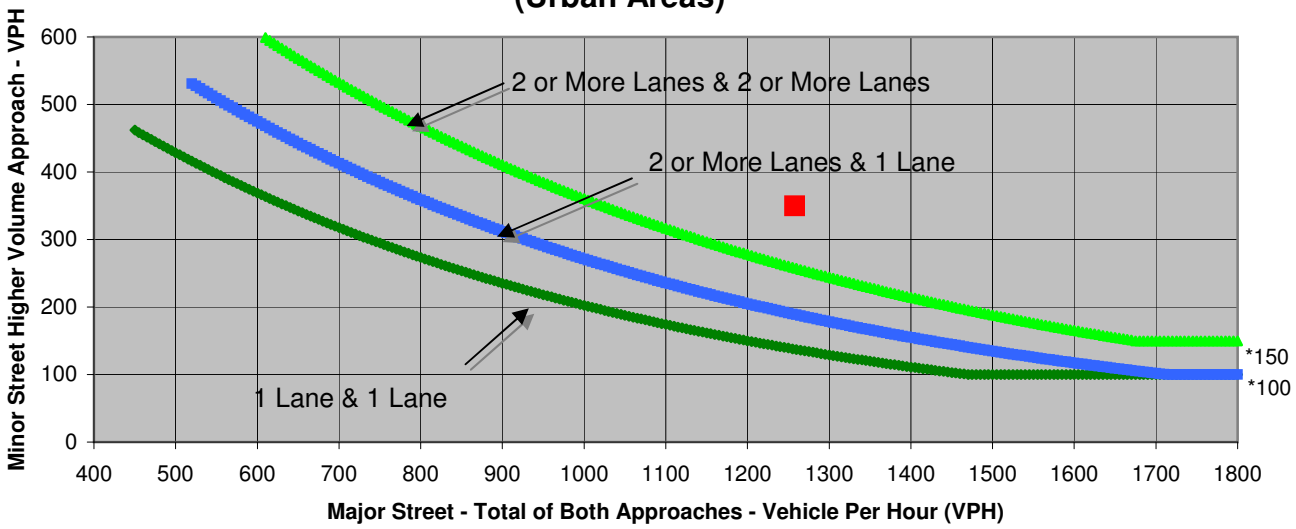
Turn Movement Volumes

	NB	SB	EB	WB
Left	15	447	0	335
Through	646	150	0	0
Right	0	0	0	15
Total	661	597	0	350

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	SR 120 WB	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	1,258	350	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour PM

Major Street Union Road
Minor Street Woodward Avenue

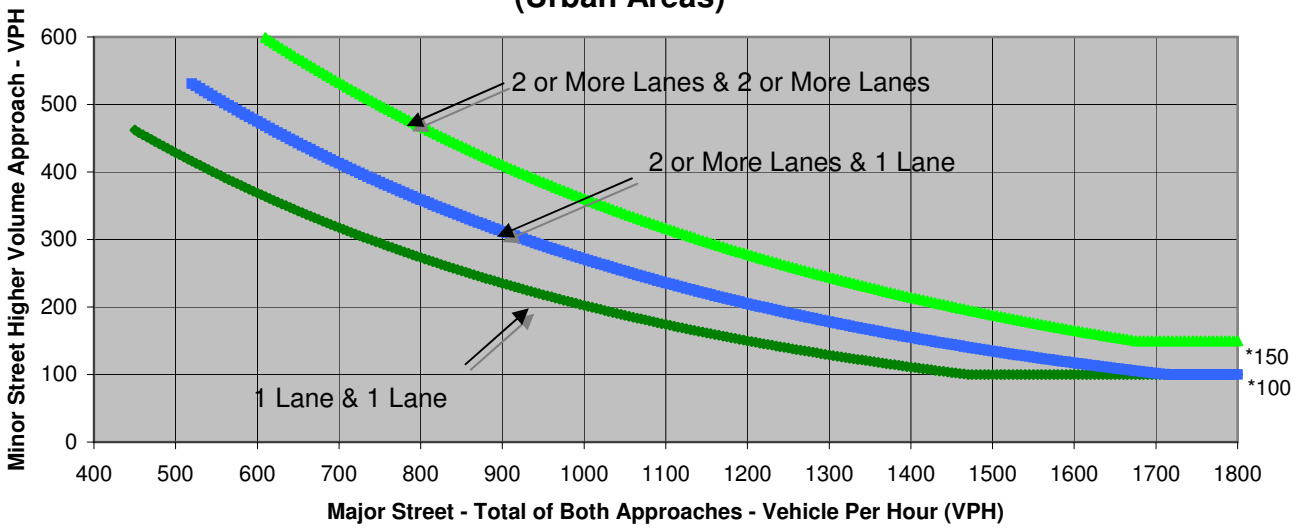
Turn Movement Volumes

	NB	SB	EB	WB
Left	2	102	12	8
Through	114	127	75	37
Right	12	9	3	49
Total	128	238	90	94

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	2	3	NO
Traffic Volume (VPH) *	366	94	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Atherton Drive
Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

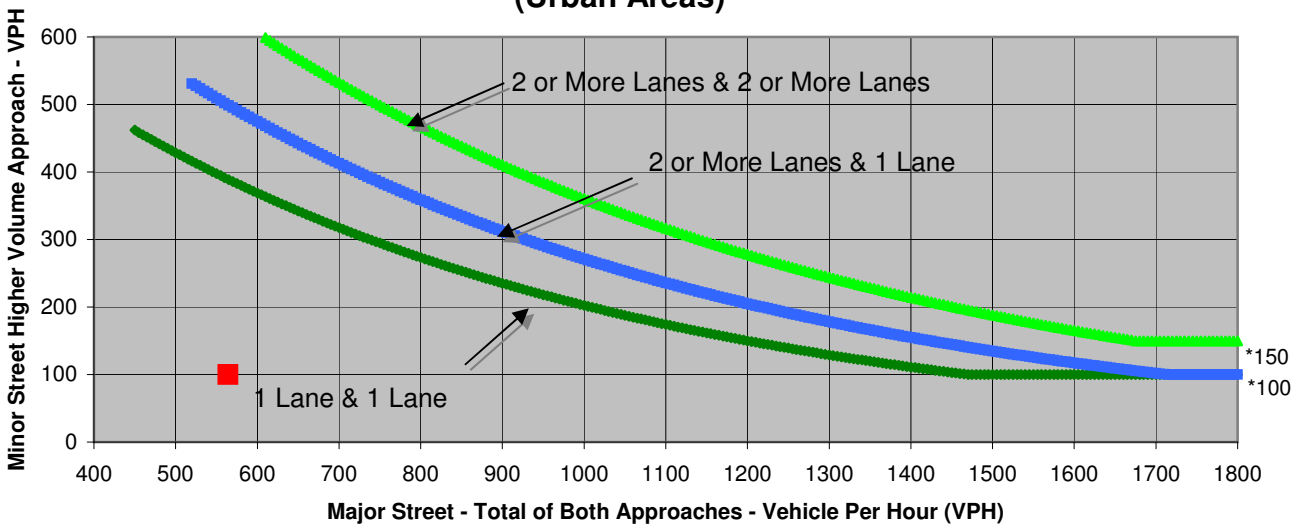
Turn Movement Volumes

	NB	SB	EB	WB
Left	3	92	87	4
Through	140	272	7	3
Right	6	51	6	61
Total	149	415	100	68

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	NO
Traffic Volume (VPH) *	564	100	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 120 EB
Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

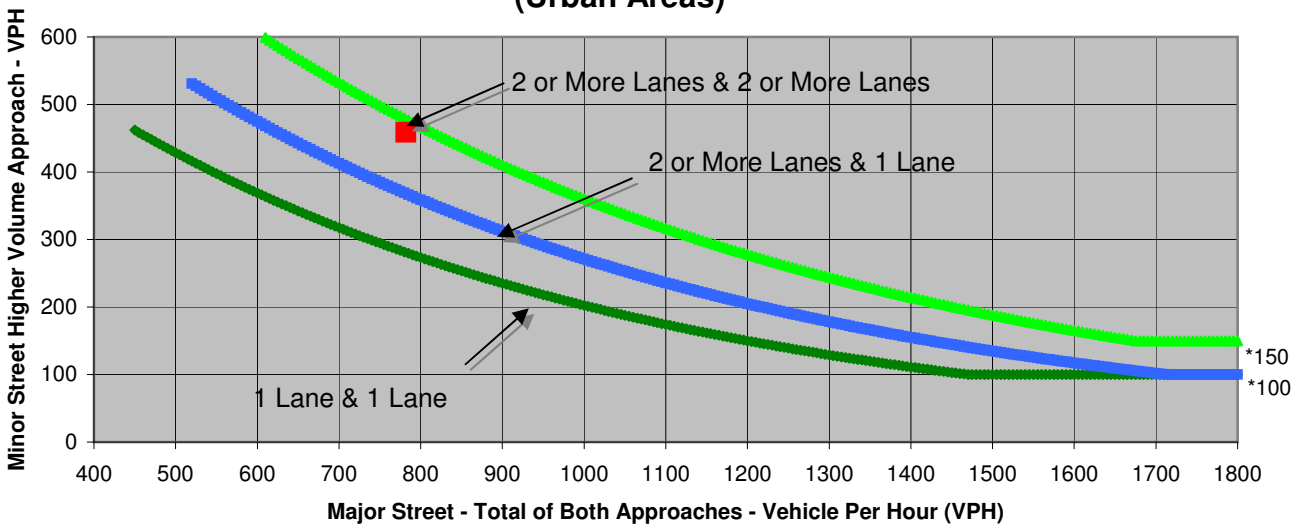
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	198	340	0
Through	234	296	0	0
Right	54	0	119	0
Total	288	494	459	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 EB	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	782	459	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 120 WB
Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

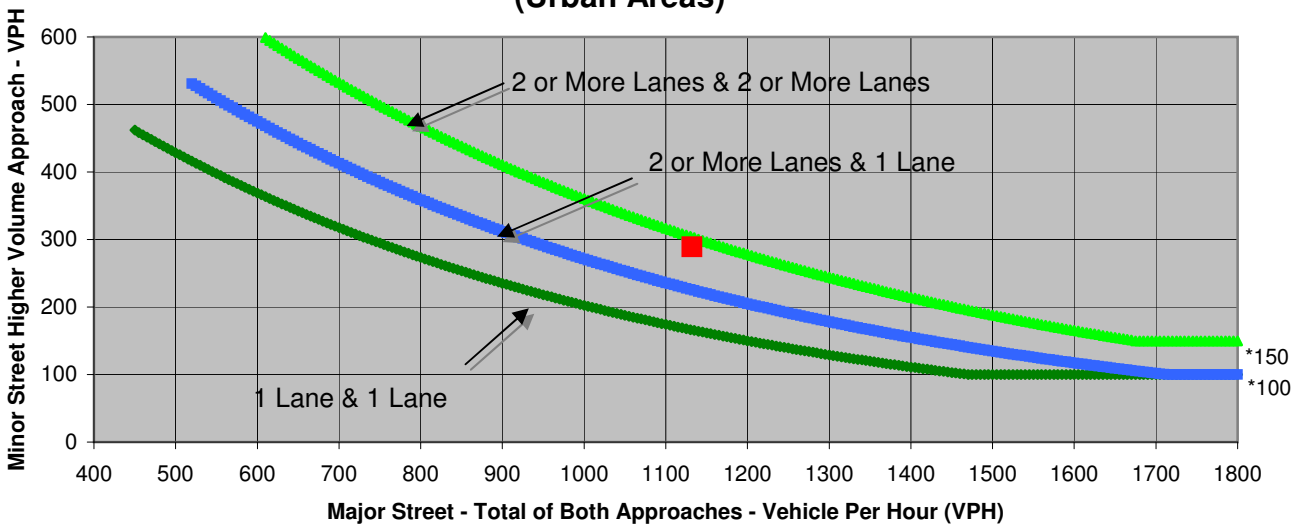
Turn Movement Volumes

	NB	SB	EB	WB
Left	46	0	0	188
Through	528	393	0	0
Right	0	165	0	101
Total	574	558	0	289

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 WB	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	1,132	289	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Wawona Street
Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

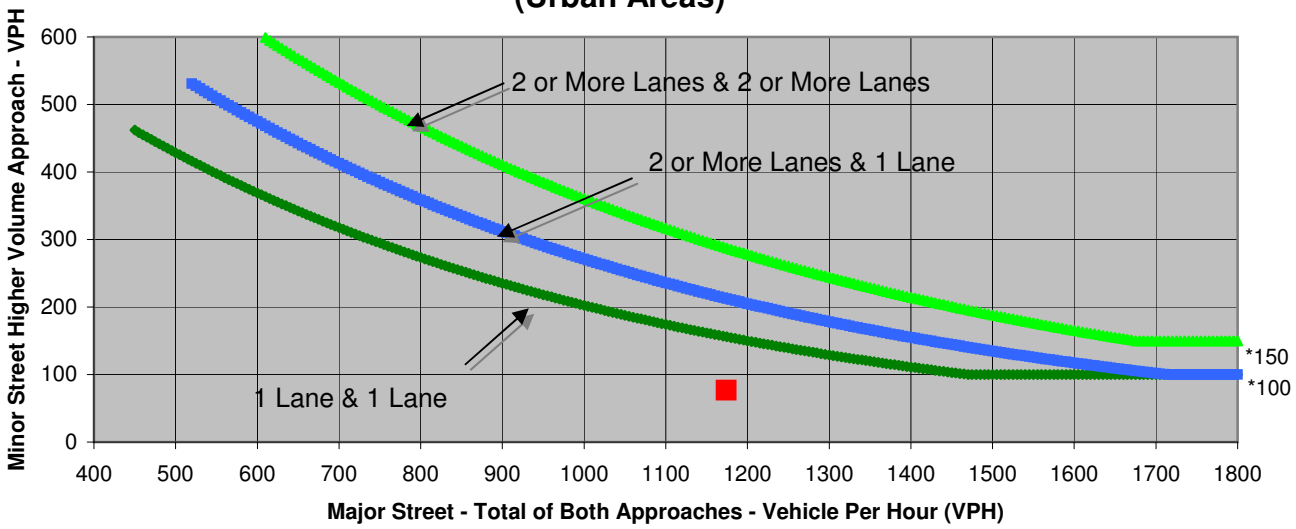
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	76	0	46
Through	478	551	0	0
Right	69	0	0	31
Total	547	627	0	77

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	1,174	77	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

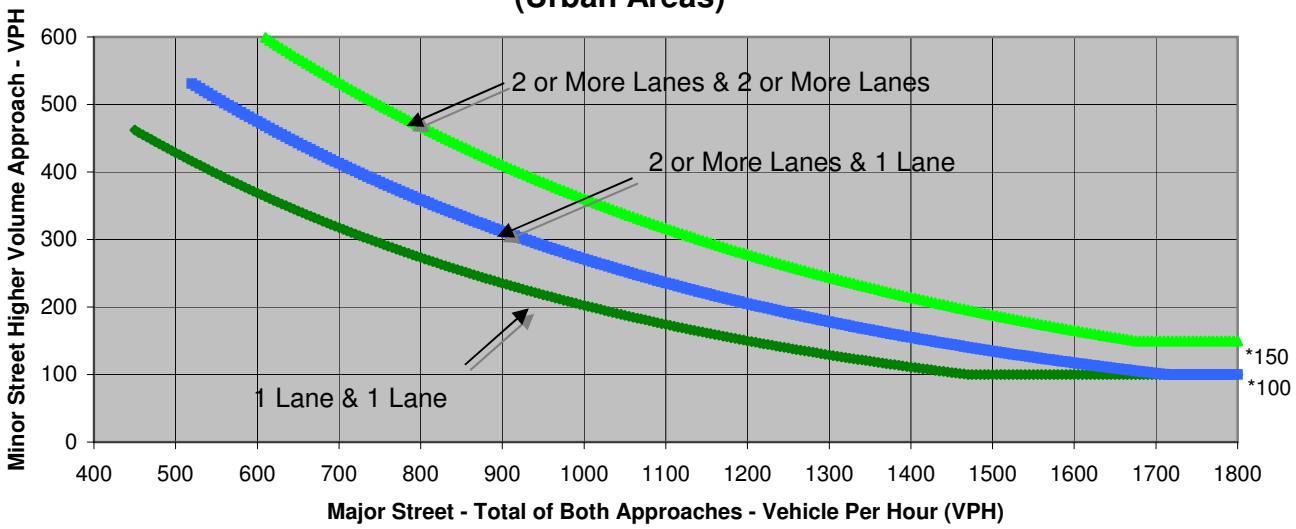
Turn Movement Volumes

	NB	SB	EB	WB
Left	7	42	36	3
Through	82	199	22	22
Right	5	43	4	31
Total	94	284	62	56

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	378	62	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Woodward Avenue

Project	Union Crossing
Scenario	Existing No Project
Peak Hour	PM

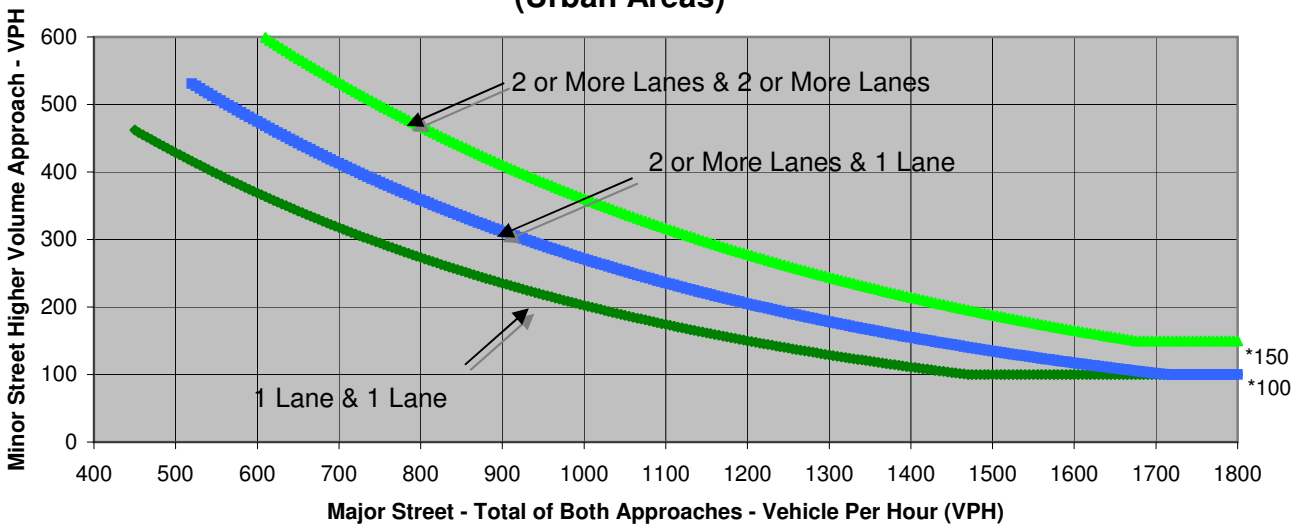
Turn Movement Volumes

	NB	SB	EB	WB
Left	23	209	22	20
Through	160	223	117	66
Right	16	32	49	107
Total	199	464	188	193

Major Street Direction

	North/South
x	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	3	NO
Traffic Volume (VPH) *	381	464	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing No Project
Peak Hour PM

Major Street Union Road
Minor Street Atherton Drive

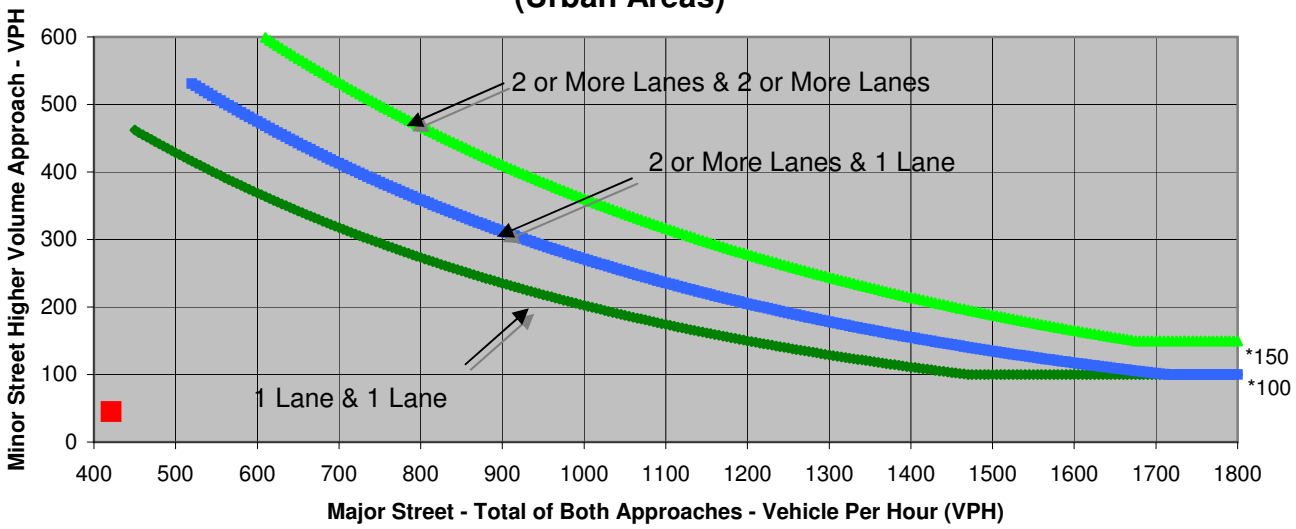
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	31	0	1
Through	167	221	0	0
Right	2	0	0	44
Total	169	252	0	45

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

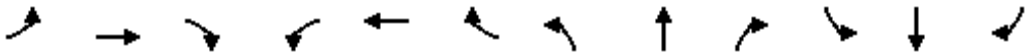


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Atherton Drive	
Number of Approach Lanes	3	3	NO
Traffic Volume (VPH) *	421	45	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3394		1770	3256		1770	1827	1583	1770	1801	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3394		1770	3256		1770	1827	1583	1770	1801	
Volume (vph)	87	250	94	249	180	206	41	295	173	200	284	34
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	95	272	102	271	196	224	46	328	192	211	299	36
RTOR Reduction (vph)	0	36	0	0	166	0	0	0	123	0	4	0
Lane Group Flow (vph)	95	338	0	271	254	0	46	328	69	211	331	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	8.2	15.0		19.1	25.9		3.8	34.1	34.1	15.6	45.9	
Effective Green, g (s)	8.2	15.0		19.1	25.9		3.8	34.1	34.1	15.6	45.9	
Actuated g/C Ratio	0.08	0.15		0.19	0.26		0.04	0.34	0.34	0.16	0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	145	510		339	845		67	624	541	277	828	
v/s Ratio Prot	0.05	c0.10		c0.15	0.08		0.03	c0.18		c0.12	0.18	
v/s Ratio Perm									0.04			
v/c Ratio	0.66	0.66		0.80	0.30		0.69	0.53	0.13	0.76	0.40	
Uniform Delay, d1	44.4	40.0		38.5	29.7		47.4	26.4	22.6	40.3	17.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.2	3.2		12.4	0.2		25.3	3.1	0.5	11.7	1.4	
Delay (s)	54.6	43.3		50.9	29.9		72.8	29.5	23.1	52.0	19.3	
Level of Service	D	D		D	C		E	C	C	D	B	
Approach Delay (s)		45.6			38.1			30.8			31.9	
Approach LOS		D			D			C			C	

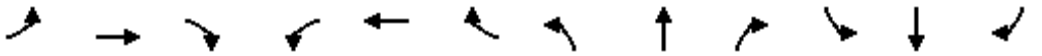
Intersection Summary			
HCM Average Control Delay	36.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	99.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	46	31	478	69	76	551
Peak Hour Factor	0.85	0.85	0.90	0.90	0.95	0.95
Hourly flow rate (vph)	54	36	531	77	80	580
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.82	0.82			0.82	
vC, conflicting volume	1311	573			610	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1378	482			526	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	54	92			91	
cM capacity (veh/h)	119	480			856	

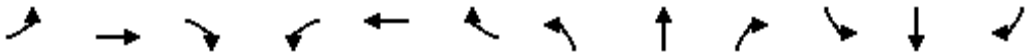
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	91	608	660
Volume Left	54	0	80
Volume Right	36	77	0
cSH	170	1700	856
Volume to Capacity	0.53	0.36	0.09
Queue Length 95th (ft)	67	0	8
Control Delay (s)	47.8	0.0	2.4
Lane LOS	E		A
Approach Delay (s)	47.8	0.0	2.4
Approach LOS	E		

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1565	1770	1863	1562	1770	3471	1548	1770	1827	1548
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1565	1770	1863	1562	1770	3471	1548	1770	1827	1548
Volume (vph)	77	26	120	54	22	8	174	462	80	22	384	191
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	91	31	141	64	26	9	193	513	89	23	404	201
RTOR Reduction (vph)	0	0	96	0	0	7	0	0	49	0	0	136
Lane Group Flow (vph)	91	31	45	64	26	2	193	513	40	23	404	65
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		pm+ov	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.8	11.0	20.8	7.0	11.2	11.2	9.8	28.9	28.9	1.8	20.9	20.9
Effective Green, g (s)	6.8	11.0	20.8	7.0	11.2	11.2	9.8	28.9	28.9	1.8	20.9	20.9
Actuated g/C Ratio	0.11	0.17	0.32	0.11	0.17	0.17	0.15	0.45	0.45	0.03	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	361	317	600	191	322	270	268	1550	691	49	590	500
v/s Ratio Prot	0.03	c0.02	0.01	c0.04	0.01		c0.11	0.15		0.01	c0.22	
v/s Ratio Perm			0.02			0.00			0.03			0.04
v/c Ratio	0.25	0.10	0.08	0.34	0.08	0.01	0.72	0.33	0.06	0.47	0.68	0.13
Uniform Delay, d1	26.6	22.7	15.3	26.7	22.4	22.1	26.1	11.6	10.2	31.0	19.0	15.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.01	0.99	0.89	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.1	1.0	0.1	0.0	9.2	0.1	0.0	6.9	3.3	0.1
Delay (s)	27.0	22.8	15.3	27.7	22.5	22.2	35.5	11.6	9.1	37.9	22.3	15.6
Level of Service	C	C	B	C	C	C	D	B	A	D	C	B
Approach Delay (s)		20.2			25.9			17.1			20.7	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	64.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

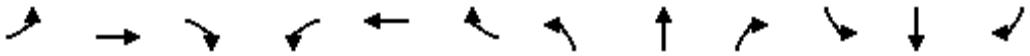


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	101	0	188	46	528	0	0	393	165
Peak Hour Factor	0.25	0.25	0.25	0.65	0.65	0.65	0.80	0.80	0.80	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	155	0	289	58	660	0	0	437	183
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											494	
pX, platoon unblocked	0.81	0.81	0.81	0.81	0.81		0.81					
vC, conflicting volume	1593	1303	528	1303	1395	660	620			660		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1736	1377	414	1377	1490	660	528			660		
tC, single (s)	7.1	6.5	6.2	*6.4	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	0	100	36	93			100		
cM capacity (veh/h)	19	109	514	123	93	453	837			928		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	445	58	660	620
Volume Left	155	58	0	0
Volume Right	289	0	0	183
cSH	234	837	1700	1700
Volume to Capacity	1.90	0.07	0.39	0.36
Queue Length 95th (ft)	791	6	0	0
Control Delay (s)	456.9	9.6	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	456.9	0.8		0.0
Approach LOS	F			

Intersection Summary				
Average Delay	114.3			
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value

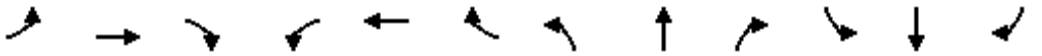


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	340	2	119	0	0	0	0	234	54	198	296	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.80	0.80	0.80
Hourly flow rate (vph)	378	2	132	0	0	0	0	260	60	248	370	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1155	1185	370	1288	1155	290	370			320		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1155	1185	370	1288	1155	290	370			320		
tC, single (s)	*6.5	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	99	80	100	100	100	100			79		
cM capacity (veh/h)	177	150	676	94	156	749	1189			1207		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	512	320	248	370
Volume Left	378	0	248	0
Volume Right	132	60	0	0
cSH	219	1700	1207	1700
Volume to Capacity	2.34	0.19	0.21	0.22
Queue Length 95th (ft)	1034	0	19	0
Control Delay (s)	653.1	0.0	8.8	0.0
Lane LOS	F		A	
Approach Delay (s)	653.1	0.0	3.5	
Approach LOS	F			

Intersection Summary				
Average Delay	232.2			
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			

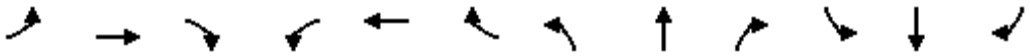
* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	87	7	6	4	3	61	3	140	6	92	272	51
Peak Hour Factor	0.90	0.90	0.90	0.70	0.70	0.70	0.90	0.90	0.90	0.85	0.85	0.85
Hourly flow rate (vph)	97	8	7	6	4	87	3	156	7	108	320	60
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	744	705	320	706	759	156	380			162		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	744	705	320	706	759	156	380			162		
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 %	65	98	99	98	99	90	100			92		
cM capacity (veh/h)	277	332	721	321	310	890	1178			1417		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	111	6	91	3	156	7	108	320	60
Volume Left	97	6	0	3	0	0	108	0	0
Volume Right	7	0	87	0	0	7	0	0	60
cSH	299	321	934	1178	1700	1700	1417	1700	1700
Volume to Capacity	0.37	0.02	0.10	0.00	0.09	0.00	0.08	0.19	0.04
Queue Length 95th (ft)	41	1	8	0	0	0	6	0	0
Control Delay (s)	24.3	16.4	9.8	8.1	0.0	0.0	7.8	0.0	0.0
Lane LOS	C	C	A	A			A		
Approach Delay (s)	24.3	10.2		0.2			1.7		
Approach LOS	C	B							

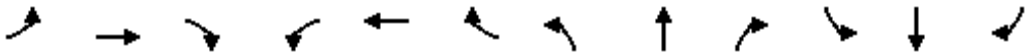
Intersection Summary				
Average Delay	5.3			
Intersection Capacity Utilization	39.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	36	22	4	3	22	31	7	82	5	42	199	43
Peak Hour Factor	0.85	0.85	0.85	0.80	0.80	0.80	0.85	0.85	0.85	0.90	0.90	0.90
Hourly flow rate (vph)	42	26	5	4	28	39	8	96	6	47	221	48

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	73	70	111	316
Volume Left (vph)	42	4	8	47
Volume Right (vph)	5	39	6	48
Hadj (s)	0.11	-0.29	0.02	-0.03
Departure Headway (s)	5.1	4.7	4.6	4.4
Degree Utilization, x	0.10	0.09	0.14	0.38
Capacity (veh/h)	643	690	736	792
Control Delay (s)	8.7	8.2	8.4	10.1
Approach Delay (s)	8.7	8.2	8.4	10.1
Approach LOS	A	A	A	B

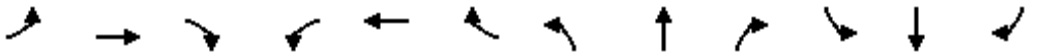
Intersection Summary			
Delay	9.3		
HCM Level of Service	A		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3407		1770	3300		1770	3361	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3407		1770	3300		1770	3361	
Volume (vph)	287	419	251	85	326	108	214	479	74	116	440	222
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	312	455	273	92	354	117	252	564	87	129	489	247
RTOR Reduction (vph)	0	0	184	0	42	0	0	15	0	0	78	0
Lane Group Flow (vph)	312	455	89	92	429	0	252	636	0	129	658	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	13.0	25.0	25.0	4.7	16.7		11.0	23.3		7.8	20.1	
Effective Green, g (s)	13.0	25.0	25.0	4.7	16.7		11.0	23.3		7.8	20.1	
Actuated g/C Ratio	0.17	0.33	0.33	0.06	0.22		0.14	0.30		0.10	0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	300	606	515	108	741		254	1001		180	880	
v/s Ratio Prot	c0.18	c0.24		0.05	0.13		c0.14	c0.19		0.07	c0.20	
v/s Ratio Perm			0.06									
v/c Ratio	1.04	0.75	0.17	0.85	0.58		0.99	0.64		0.72	0.75	
Uniform Delay, d1	31.9	23.1	18.5	35.7	26.9		32.9	23.1		33.4	26.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	62.7	5.2	0.2	43.9	1.1		54.1	3.1		12.7	5.8	
Delay (s)	94.6	28.3	18.7	79.6	28.0		86.9	26.2		46.2	31.8	
Level of Service	F	C	B	E	C		F	C		D	C	
Approach Delay (s)		45.7			36.4			43.1			33.9	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	40.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

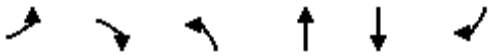
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.91		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1754		1770	1704		1770	3282		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1754		1770	1704		1770	3282		1770	1863	1583
Volume (vph)	45	95	60	75	95	125	90	625	145	155	425	70
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	53	112	71	88	112	147	106	735	171	172	472	78
RTOR Reduction (vph)	0	37	0	0	76	0	0	26	0	0	0	72
Lane Group Flow (vph)	53	146	0	88	183	0	106	880	0	172	472	6
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	4.5	11.6		4.5	11.6		4.5	22.5		7.1	25.1	4.5
Effective Green, g (s)	4.5	11.6		4.5	11.6		4.5	22.5		7.1	25.1	4.5
Actuated g/C Ratio	0.07	0.19		0.07	0.19		0.07	0.36		0.12	0.41	0.07
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	129	330		129	320		129	1197		204	758	115
v/s Ratio Prot	0.03	0.08		c0.05	c0.11		0.06	c0.27		c0.10	c0.25	0.00
v/s Ratio Perm												
v/c Ratio	0.41	0.44		0.68	0.57		0.82	0.74		0.84	0.62	0.05
Uniform Delay, d1	27.3	22.2		27.9	22.8		28.2	17.0		26.8	14.5	26.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.1	0.9		13.9	2.5		32.6	4.0		25.8	3.8	0.2
Delay (s)	29.5	23.1		41.8	25.2		60.8	21.1		52.6	18.4	26.8
Level of Service	C	C		D	C		E	C		D	B	C
Approach Delay (s)		24.5			29.4			25.2			27.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

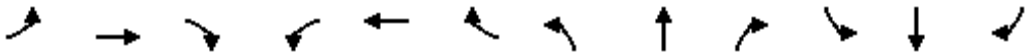
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	35	60	80	901	537	35
Peak Hour Factor	0.92	0.92	0.85	0.85	0.90	0.90
Hourly flow rate (vph)	38	65	94	1060	597	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1864	616	636			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1864	616	636			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	47	87	90			
cM capacity (veh/h)	72	490	948			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	103	1154	636
Volume Left	38	94	0
Volume Right	65	0	39
cSH	156	948	1700
Volume to Capacity	0.66	0.10	0.37
Queue Length 95th (ft)	93	8	0
Control Delay (s)	64.3	3.0	0.0
Lane LOS	F	A	
Approach Delay (s)	64.3	3.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		

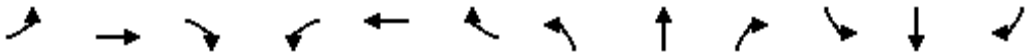


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	15	0	335	15	646	0	0	447	150
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	17	0	372	17	718	0	0	497	167
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1703	1331	580	1331	1414	718	663			718		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1703	1331	580	1331	1414	718	663			718		
tC, single (s)	7.1	6.5	6.2	*6.5	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	90	100	13	98			100		
cM capacity (veh/h)	9	152	514	162	135	429	925			883		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	17	372	17	718	663
Volume Left	17	0	17	0	0
Volume Right	0	372	0	0	167
cSH	162	429	925	1700	1700
Volume to Capacity	0.10	0.87	0.02	0.42	0.39
Queue Length 95th (ft)	8	220	1	0	0
Control Delay (s)	29.8	48.1	9.0	0.0	0.0
Lane LOS	D	E	A		
Approach Delay (s)	47.3		0.2		0.0
Approach LOS	E				

Intersection Summary				
Average Delay	10.4			
Intersection Capacity Utilization	62.6%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	455	0	40	0	0	0	0	206	5	250	212	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85
Hourly flow rate (vph)	506	0	44	0	0	0	0	229	6	294	249	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1069	1072	249	1114	1069	232	249			234		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1069	1072	249	1114	1069	232	249			234		
tC, single (s)	*6.4	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	94	100	100	100	100			78		
cM capacity (veh/h)	205	172	775	145	172	807	1316			1333		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	550	234	294	249
Volume Left	506	0	294	0
Volume Right	44	6	0	0
cSH	218	1700	1333	1700
Volume to Capacity	2.53	0.14	0.22	0.15
Queue Length 95th (ft)	1151	0	21	0
Control Delay (s)	735.8	0.0	8.5	0.0
Lane LOS	F		A	
Approach Delay (s)	735.8	0.0	4.6	
Approach LOS	F			

Intersection Summary				
Average Delay	306.6			
Intersection Capacity Utilization	62.6%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	1	44	167	2	31	221
Peak Hour Factor	0.85	0.85	0.75	0.75	0.85	0.85
Hourly flow rate (vph)	1	52	223	3	36	260
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	557	224			225	
vC1, stage 1 conf vol	224					
vC2, stage 2 conf vol	333					
vCu, unblocked vol	557	224			225	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			97	
cM capacity (veh/h)	560	815			1343	

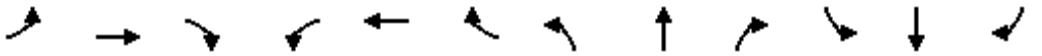
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	1	52	225	36	260
Volume Left	1	0	0	36	0
Volume Right	0	52	3	0	0
cSH	560	815	1700	1343	1700
Volume to Capacity	0.00	0.06	0.13	0.03	0.15
Queue Length 95th (ft)	0	5	0	2	0
Control Delay (s)	11.4	9.7	0.0	7.8	0.0
Lane LOS	B	A		A	
Approach Delay (s)	9.8		0.0	1.0	
Approach LOS	A				

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection has too many lanes per leg.

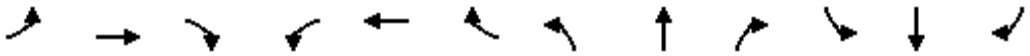
HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1491
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1491
Volume (vph)	0	0	0	37	0	249	66	616	0	0	472	388
Peak-hour factor, PHF	0.25	0.25	0.25	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	39	0	262	73	684	0	0	497	408
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	222
Lane Group Flow (vph)	0	0	0	0	39	262	73	684	0	0	497	186
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					8.0	52.1	8.9	36.1			23.2	23.2
Effective Green, g (s)					8.0	52.1	8.9	36.1			23.2	23.2
Actuated g/C Ratio					0.15	1.00	0.17	0.69			0.45	0.45
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					4.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)					267	1492	297	1242			798	664
v/s Ratio Prot					0.02		0.04	c0.38			c0.28	
v/s Ratio Perm						c0.18						0.12
v/c Ratio					0.15	0.18	0.25	0.55			0.62	0.28
Uniform Delay, d1					19.1	0.0	18.7	4.0			11.1	9.2
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.3	0.3	0.6	0.7			1.7	0.3
Delay (s)					19.4	0.3	19.3	4.6			12.8	9.5
Level of Service					B	A	B	A			B	A
Approach Delay (s)		0.0			2.7			6.0			11.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	52.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1518					1800		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1518					1800		1703	1827	
Volume (vph)	420	0	183	0	0	0	0	262	27	228	281	0
Peak-hour factor, PHF	0.80	0.80	0.80	0.25	0.25	0.25	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	525	0	229	0	0	0	0	291	30	240	296	0
RTOR Reduction (vph)	0	0	127	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	525	102	0	0	0	0	317	0	240	296	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		30.9	30.9					19.2		13.1	36.3	
Effective Green, g (s)		30.9	30.9					19.2		13.1	36.3	
Actuated g/C Ratio		0.41	0.41					0.26		0.17	0.48	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		700	624					460		297	882	
v/s Ratio Prot		c0.31						c0.18		c0.14	0.16	
v/s Ratio Perm			0.07									
v/c Ratio		0.75	0.16					0.69		0.81	0.34	
Uniform Delay, d1		18.9	14.0					25.3		29.8	12.0	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		4.5	0.1					4.3		14.8	0.2	
Delay (s)		23.4	14.1					29.6		44.7	12.2	
Level of Service		C	B					C		D	B	
Approach Delay (s)		20.6			0.0			29.6			26.7	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM Average Control Delay	24.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.4%	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			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	0	0	289	0	0	464	0
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	0	0	0	0	304	0	0	546	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	850	850	546	850	850	304	546			304		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	837	837	507	837	837	304	507			304		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	263	279	521	263	279	736	974			1257		

Direction, Lane #	NB 1	SB 1
Volume Total	304	546
Volume Left	0	0
Volume Right	0	0
cSH	974	1257
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec): 100 | Critical Vol./Cap.(X): 0.196
Loss Time (sec): 0 (Y+R=4.0 sec) | Average Delay (sec/veh): 9.2
Optimal Cycle: 0 | Level Of Service: A

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	2	114	12	102	127	9	12	75	3	8	37	49
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	2	114	12	102	127	9	12	75	3	8	37	49
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	2	114	12	102	127	9	12	75	3	8	37	49
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	2	114	12	102	127	9	12	75	3	8	37	49
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	2	114	12	102	127	9	12	75	3	8	37	49
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	2	114	12	102	127	9	12	75	3	8	37	49
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	567	618	699	596	650	741	543	590	663	542	588	665
Capacity Analysis Module:												
Vol/Sat:	0.00	0.18	0.02	0.17	0.20	0.01	0.02	0.13	0.00	0.01	0.06	0.07
Crit Moves:		****			****			****				****
Delay/Veh:	8.8	9.4	7.6	9.7	9.3	7.4	9.1	9.2	7.8	9.0	8.8	8.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.8	9.4	7.6	9.7	9.3	7.4	9.1	9.2	7.8	9.0	8.8	8.1
LOS by Move:	A	A	A	A	A	A	A	A	A	A	A	A
ApproachDel:	9.3			9.4			9.2			8.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.3			9.4			9.2			8.5		
LOS by Appr:	A			A			A			A		
AllWayAvgQ:	0.0	0.2	0.0	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.1

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #14

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.50			0.60			0.47			0.46		
P[C2]:	0.25			0.14			0.07			0.08		
P[C3]:	0.16			0.19			0.34			0.34		
P[C4]:	0.09			0.06			0.11			0.11		
P[C5]:	0.01			0.00			0.01			0.01		
Padj[C1]:	0.009			0.007			0.011			0.011		
Padj[C2]:	0.001			0.002			0.005			0.005		
Padj[C3]:	-0.004			-0.005			-0.009			-0.009		
Padj[C4]:	-0.005			-0.004			-0.006			-0.007		
Padj[C5]:	-0.001			-0.000			-0.001			-0.001		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	2	12		102	9		12	3		8	49	
Capacity:	567	699		596	741		543	663		542	665	
DegOfUtil:	0.00	0.02		0.17	0.01		0.02	0.00		0.01	0.07	
DepHeadway:	6.06	4.86		5.84	4.64		6.25	5.05		6.25	5.05	
ServiceTime:	3.8	2.6		3.5	2.3		3.9	2.7		4.0	2.8	
Delay:	8.8	7.6		9.7	7.4		9.1	7.8		9.0	8.1	
Queue:	0.0	0.0		0.2	0.0		0.0	0.0		0.0	0.1	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	114			127			75			37		
Capacity:	618			650			590			588		
DegOfUtil:	0.18			0.19			0.12			0.06		
DepHeadway:	5.56			5.34			5.75			5.75		
ServiceTime:	3.3			3.0			3.4			3.5		
Delay:	9.4			9.3			9.2			8.8		
Queue:	0.2			0.2			0.1			0.1		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	9.3			9.4			9.2			8.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.3			9.4			9.2			8.5		
LOS by Appr:	A			A			A			A		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	9.2
OverallLOS:	A

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0	1	1 0 1	0	1	1 0 1	0	1	1 0 1	0	1
Initial Vol:	2	114	12	102	127	9	12	75	3	8	37	49

Major Street Volume: 366
Minor Approach Volume: 94
Minor Approach Volume Threshold: 806

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec): 100 | Critical Vol./Cap.(X): 0.409
Loss Time (sec): 0 (Y+R=4.0 sec) | Average Delay (sec/veh): 12.1
Optimal Cycle: 0 | Level Of Service: B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	23	160	16	209	223	32	22	117	49	20	66	107
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	23	160	16	209	223	32	22	117	49	20	66	107
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	23	160	16	209	223	32	22	117	49	20	66	107
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	23	160	16	209	223	32	22	117	49	20	66	107
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	23	160	16	209	223	32	22	117	49	20	66	107
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	23	160	16	209	223	32	22	117	49	20	66	107
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	459	496	542	512	550	608	447	480	526	446	477	528
Capacity Analysis Module:												
Vol/Sat:	0.05	0.32	0.03	0.41	0.41	0.05	0.05	0.24	0.09	0.04	0.14	0.20
Crit Moves:		****		****				****				****
Delay/Veh:	10.4	12.6	9.0	13.9	13.0	8.6	10.6	11.8	9.6	10.6	10.8	10.5
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.4	12.6	9.0	13.9	13.0	8.6	10.6	11.8	9.6	10.6	10.8	10.5
LOS by Move:	B	B	A	B	B	A	B	B	A	B	B	B
ApproachDel:	12.0			13.1			11.1			10.6		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	12.0			13.1			11.1			10.6		
LOS by Appr:	B			B			B			B		
AllWayAvgQ:	0.0	0.4	0.0	0.6	0.6	0.0	0.0	0.3	0.1	0.0	0.1	0.2

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #18

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.16			0.29			0.15			0.15		
P[C2]:	0.30			0.16			0.07			0.07		
P[C3]:	0.15			0.28			0.37			0.37		
P[C4]:	0.32			0.22			0.33			0.33		
P[C5]:	0.07			0.04			0.07			0.08		
Padj[C1]:	0.018			0.015			0.021			0.021		
Padj[C2]:	0.007			0.007			0.012			0.012		
Padj[C3]:	-0.000			-0.005			-0.006			-0.006		
Padj[C4]:	-0.019			-0.013			-0.019			-0.019		
Padj[C5]:	-0.007			-0.004			-0.007			-0.008		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	23	16		209	32		22	49		20	107	
Capacity:	459	542		512	608		447	526		446	528	
DegOfUtil:	0.05	0.03		0.40	0.05		0.05	0.09		0.04	0.19	
DepHeadway:	7.36	6.16		6.82	5.62		7.52	6.32		7.53	6.33	
ServiceTime:	5.1	3.9		4.5	3.3		5.2	4.0		5.2	4.0	
Delay:	10.4	9.0		13.9	8.6		10.6	9.6		10.6	10.5	
Queue:	0.0	0.0		0.6	0.0		0.0	0.1		0.0	0.2	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	160			223			117			66		
Capacity:	496			550			480			477		
DegOfUtil:	0.31			0.39			0.23			0.13		
DepHeadway:	6.86			6.32			7.02			7.03		
ServiceTime:	4.6			4.0			4.7			4.7		
Delay:	12.6			13.0			11.8			10.8		
Queue:	0.4			0.6			0.3			0.1		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	12.0			13.1			11.1			10.6		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	12.0			13.1			11.1			10.6		
LOS by Appr:	B			B			B			B		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	12.1
OverallLOS:	B

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	23	160	16	209	223	32	22	117	49	20	66	107

Major Street Volume: 663
Minor Approach Volume: 193
Minor Approach Volume Threshold: 551

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Existing Plus Project AM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	1975	veh/h
Peak-hour factor, PHF	0.97	
Peak 15-min volume, v15	509	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1089	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1089	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.8	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Aiport
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	1938	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	527	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1106	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1106	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.0	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2027	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	551	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1157	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1157	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.8	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2141	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	582	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1222	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1222	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2013	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	547	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1149	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1149	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.7	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2487	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	676	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1419	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1419	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2724	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	740	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1554	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1554	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	23.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2806	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	762	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1601	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1601	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2996	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	814	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1710	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1710	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	2	
Density, D	26.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3006	veh/h
Peak-hour factor, PHF	0.93	
Peak 15-min volume, v15	808	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1697	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1697	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	26.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4589	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1275	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1819	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1819	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	3	
Density, D	28.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to Lathrop
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2706	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	752	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1609	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1609	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Lathrop to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2707	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	752	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1609	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1609	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4140	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1150	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1641	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1641	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	3	
Density, D	25.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4276	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1188	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1695	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1695	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	3	
Density, D	26.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1938	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	114	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1938	114		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	527	36		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2212	146		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2212$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2212	4700	No
$v_{FO} = v - v_R$	2066	4700	No
v_R	146	2000	No

$v_{3 \text{ or } av34} = v_R$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2212	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 21.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.441$

Space mean speed in ramp influence area, $S_R = 54.9$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.9$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1824	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	203	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1824	203		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	496	55		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2082	226		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2082$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2308	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2082	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A = 20.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.325$

Space mean speed in ramp influence area, $S_R = 57.5$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 57.5$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2027	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	187	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2027	187		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	551	58		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2313	240		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2313$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2313	4700	No
$v_{FO} = v - v_R$	2073	4700	No
v_R	240	2000	No

$v_{3 \text{ or } av34} = v_R$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2313	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 22.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.450$

Space mean speed in ramp influence area, $S_R = 54.7$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.7$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1844	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	297	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1844	297		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	501	81		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2105	331		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2105$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2436	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2105	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A = 21.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.331$

Space mean speed in ramp influence area, $S_R = 57.4$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 57.4$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2724	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	357	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2724	357		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	740	94		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3109	385		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3109$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_i = v_F$	3109	4700	No
$v_o = v - v_R$	2724	4700	No
v_R	385	2000	No

$v_{3 \text{ or } 4} = v_{av34}$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } 4} = v_{av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } 4} = v_{av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3109	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 29.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.463$

Space mean speed in ramp influence area, $S_R = 54.4$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.4$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2372	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	434	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2372	434		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	645	118		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2707	484		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
v = v (P) = 2707 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	3191	4700	No
FO			
v v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34			
Is v v > 2700 pc/h?		No	
3 or av34			
Is v v > 1.5 v /2		No	
3 or av34	12		
If yes, v =		(Equation 25-8)	
12A			

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	2707	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 27.0 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence C

_____Speed Estimation_____

Intermediate speed variable, M = 0.381
S
Space mean speed in ramp influence area, S = 56.2 mph
R
Space mean speed in outer lanes, S = N/A mph
0
Space mean speed for all vehicles, S = 56.2 mph

_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2806	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	214	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2806	214		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	762	56		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3202	231		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3202$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3202	4700	No
$v_{FO} = v - v_R$	2971	4700	No
v_R	231	2000	No

$v_{3 \text{ or } av34} = v_{av34} = 0$ pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} = v_{av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} = v_{av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3202	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 30.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.449$

Space mean speed in ramp influence area, $S_R = 54.7$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.7$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2592	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	404	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2592	404		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	704	110		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2958	450		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
v = v (P) = 2958 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	3408	4700	No
FO			
v v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34			
Is v v > 2700 pc/h?		No	
3 or av34			
Is v v > 1.5 v /2		No	
3 or av34	12		
If yes, v =		(Equation 25-8)	
12A			

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	2958	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 28.7 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence D

_____Speed Estimation_____

Intermediate speed variable, M = 0.404
S
Space mean speed in ramp influence area, S = 55.7 mph
R
Space mean speed in outer lanes, S = N/A mph
0
Space mean speed for all vehicles, S = 55.7 mph

_____

Leisch Method for Weaving Analysis

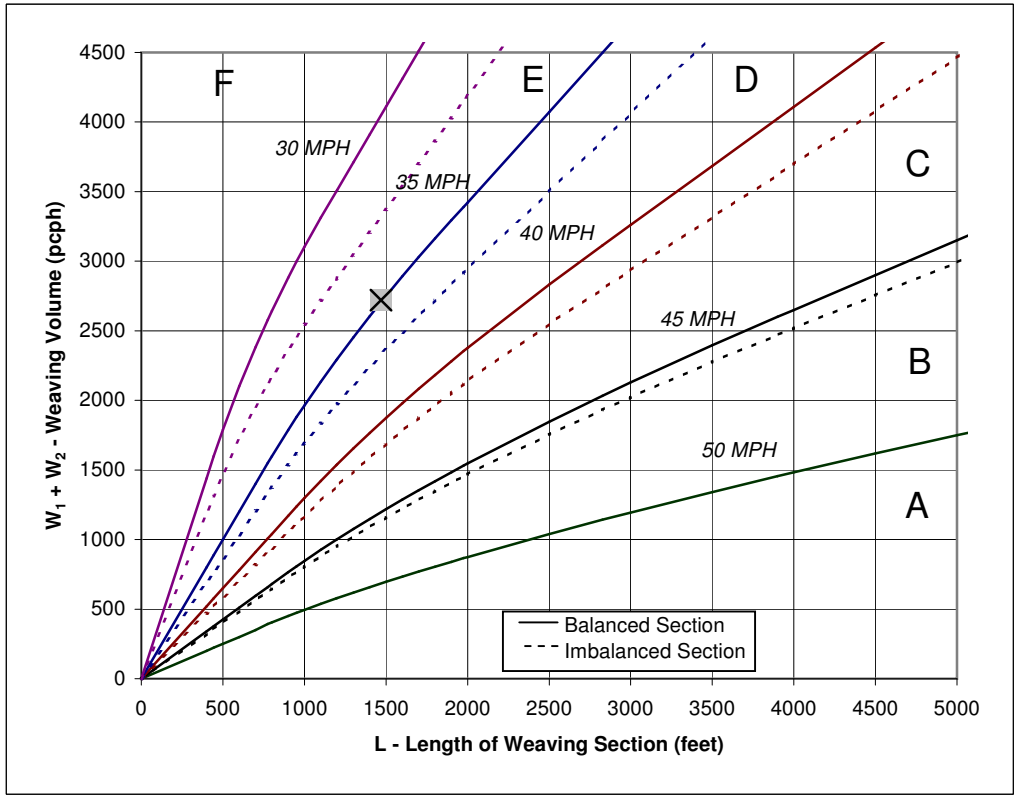
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

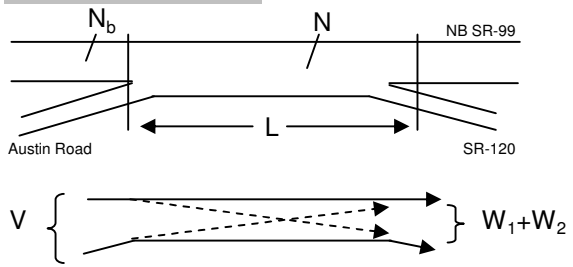
Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - AM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,386	Volume (vph)*	97	Volume (vph)*	2,495
Truck Percentage	14%	Truck Percentage	6%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	4,693	Volume (pcph)	100	Volume (pcph)	2,620



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) 34.9
4. Weaving Intensity Factor (k) 3.00
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ 1,223
6. Level of Service (LOS) C

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

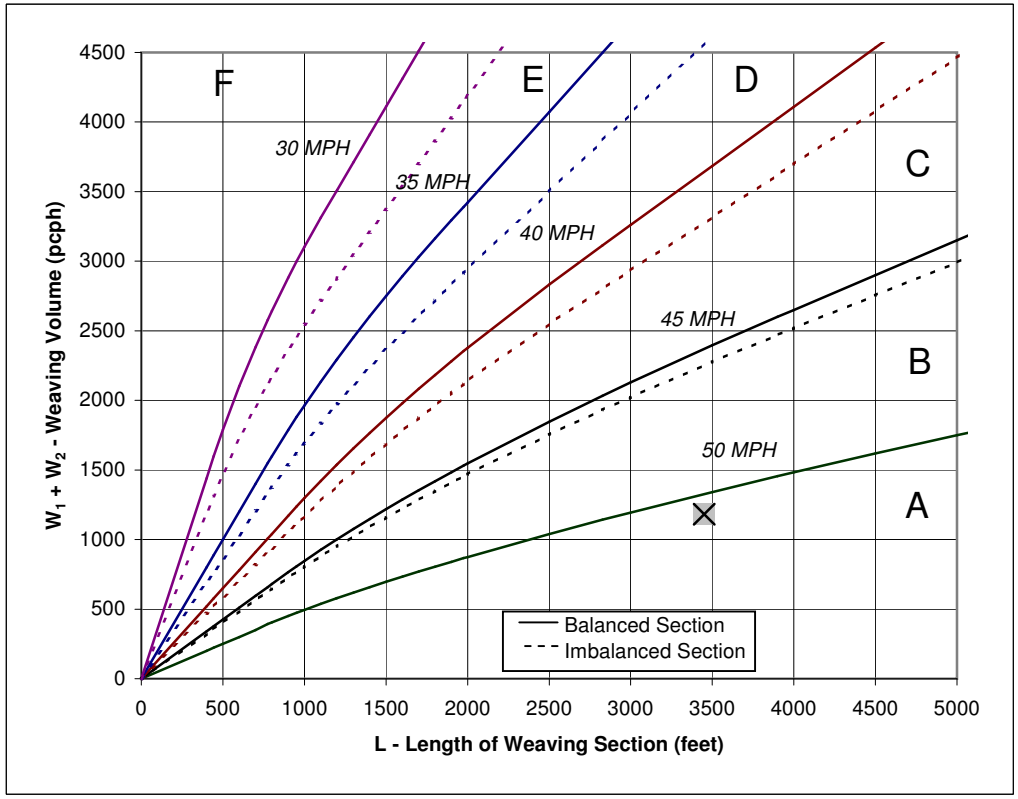
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

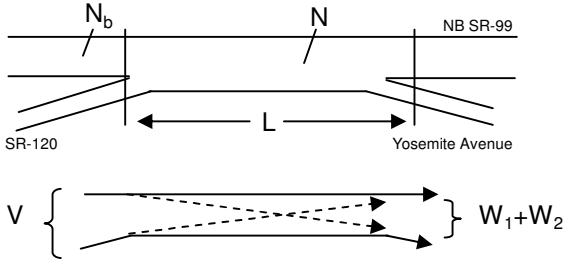
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,017	Volume (vph)*	558	Volume (vph)*	634
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,228	Volume (pcph)	550	Volume (pcph)	632

Project Information

Project	Union Crossing
Scenario	EXISTING NO PROJECT - AM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **50.7**
4. Weaving Intensity Factor (k) **1.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,076**
6. Level of Service (LOS) **C**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

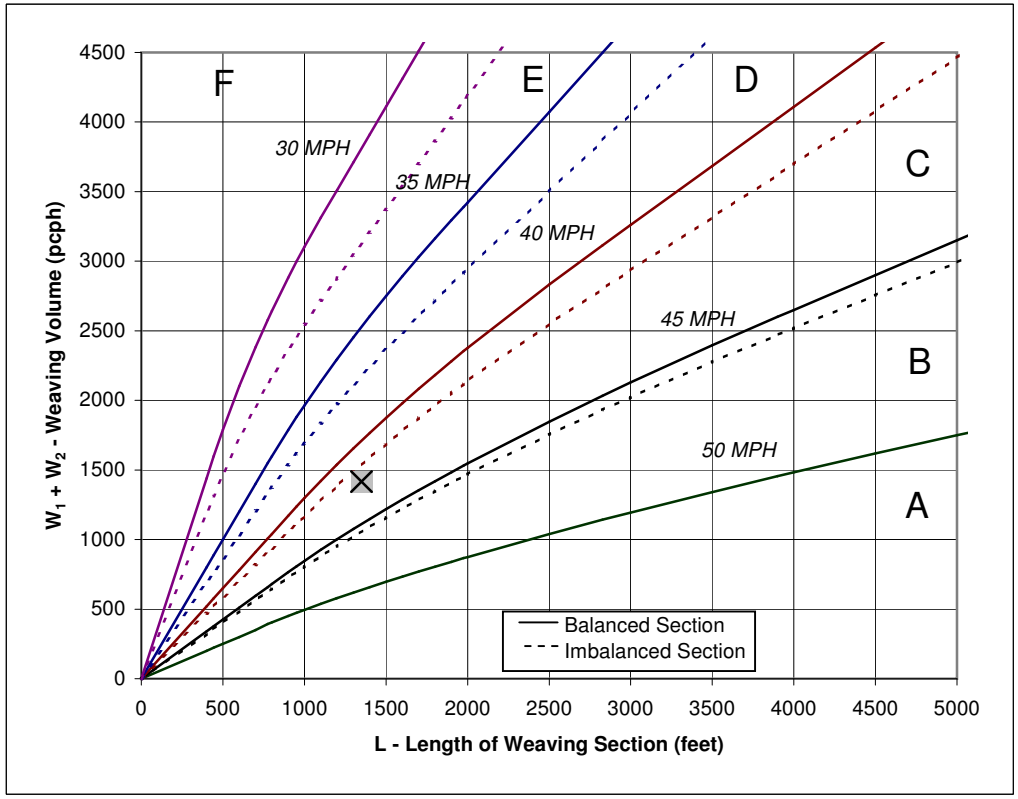
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

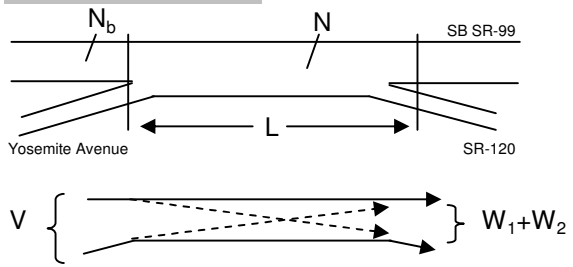
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,245	Volume (vph)*	799	Volume (vph)*	560
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,472	Volume (pcph)	839	Volume (pcph)	577

Project Information

Project	Union Crossing
Scenario	EXISTING PLUS PROJECT - AM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **41.3**
4. Weaving Intensity Factor (k) **2.41**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,428**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Wawona Street
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

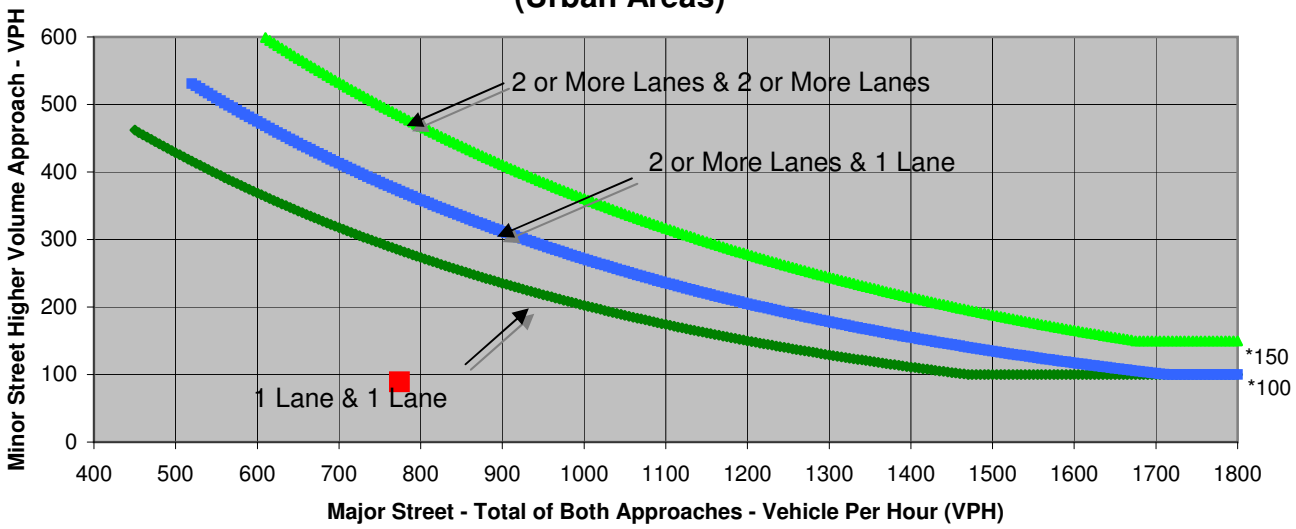
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	39	0	49
Through	326	329	0	0
Right	80	0	0	40
Total	406	368	0	89

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	774	89	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

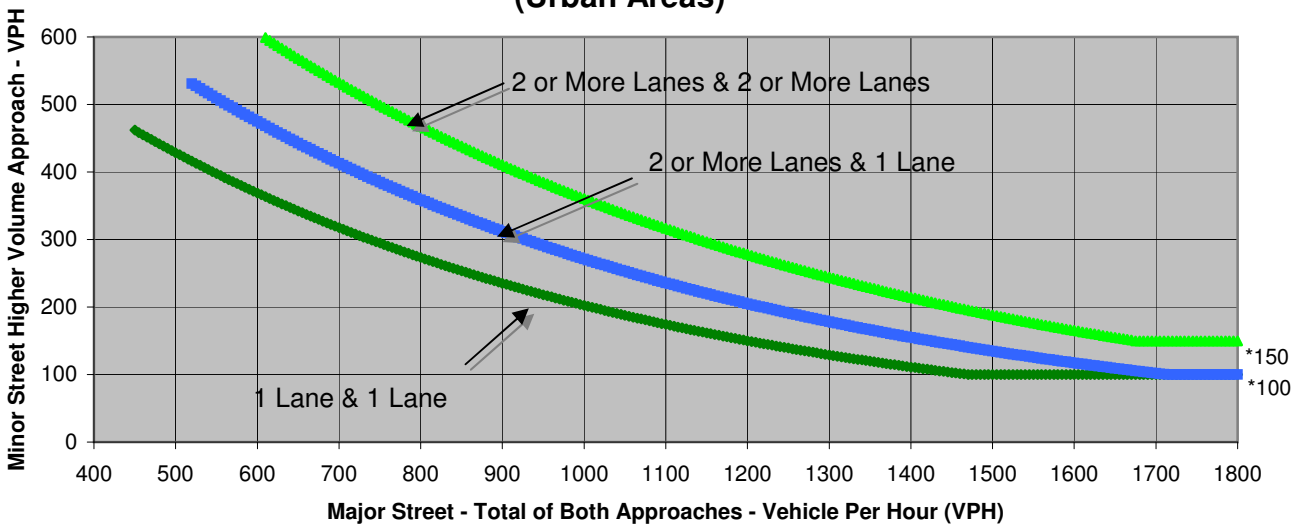
Turn Movement Volumes

	NB	SB	EB	WB
Left	13	35	45	1
Through	121	70	20	16
Right	3	38	19	25
Total	137	143	84	42

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	280	84	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

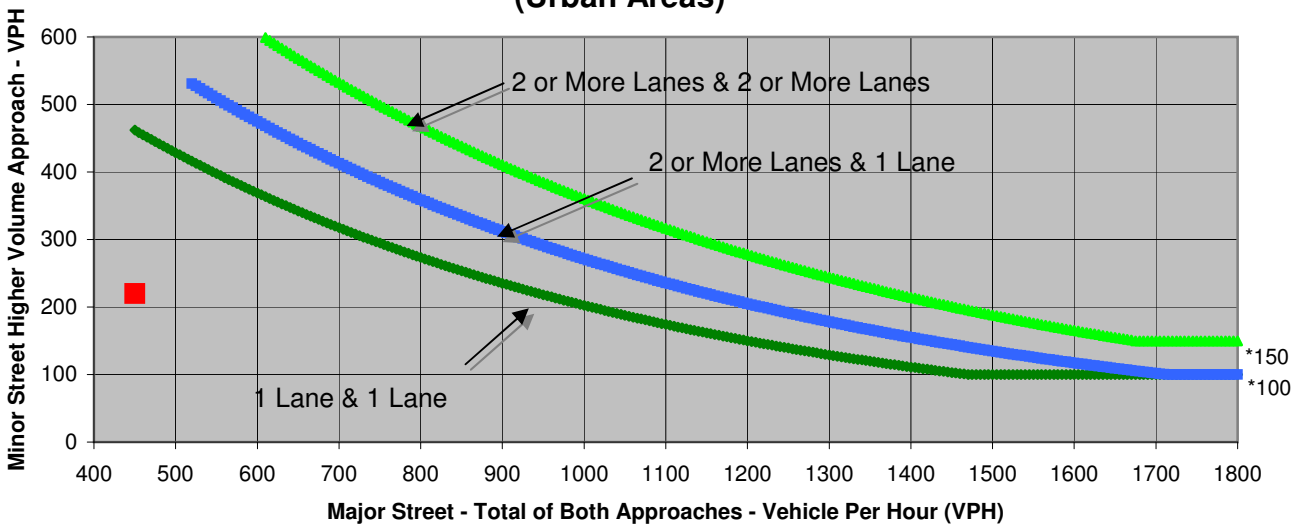
Turn Movement Volumes

	NB	SB	EB	WB
Left	34	53	18	7
Through	233	84	48	76
Right	12	34	27	137
Total	279	171	93	220

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	2	NO
Traffic Volume (VPH) *	450	220	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Project Access
Project	Union Crossing
Scenario	Existing Plus Project
Peak Hour	AM

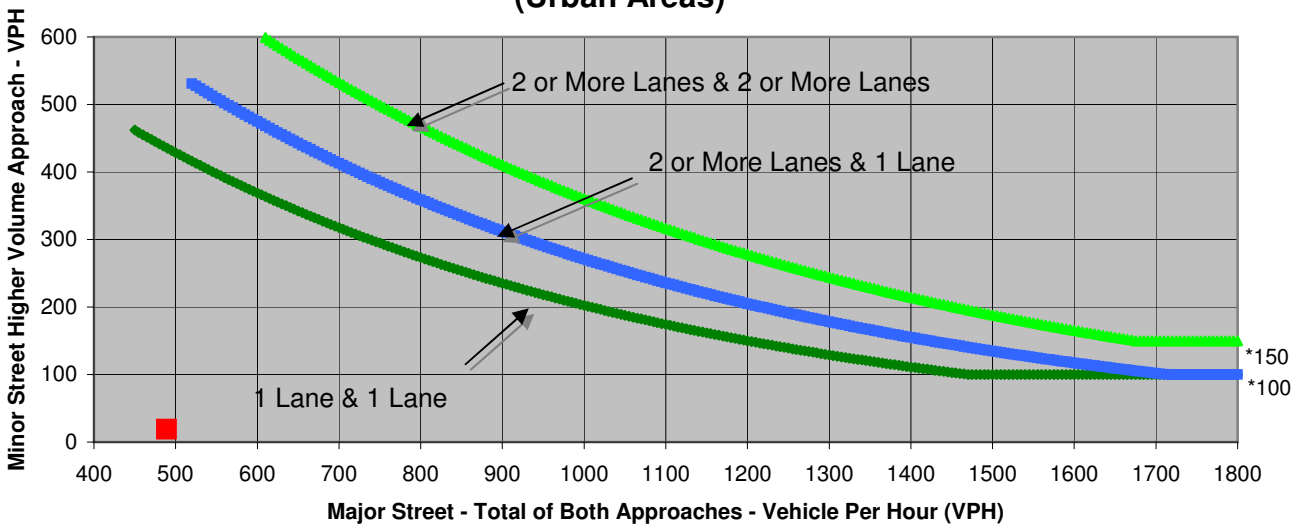
Turn Movement Volumes

	NB	SB	EB	WB
Left	11	0	17	0
Through	249	209	0	0
Right	0	20	2	0
Total	260	229	19	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Project Access	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	489	19	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Atherton Drive
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

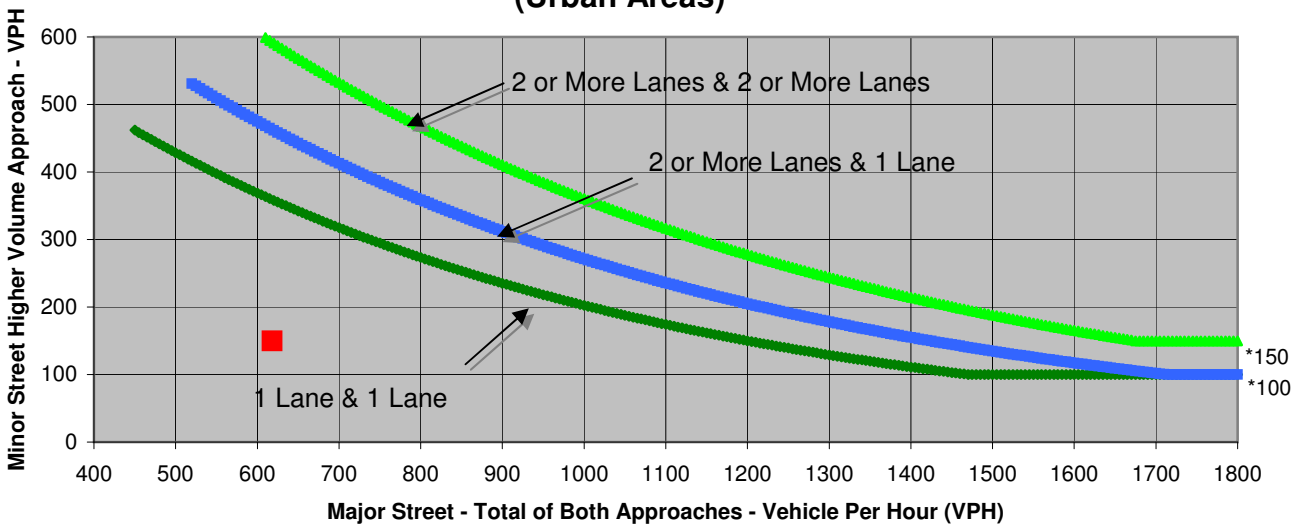
Turn Movement Volumes

	NB	SB	EB	WB
Left	37	38	141	0
Through	230	270	4	7
Right	2	41	5	38
Total	269	349	150	45

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	NO
Traffic Volume (VPH) *	618	150	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Daniels Street
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

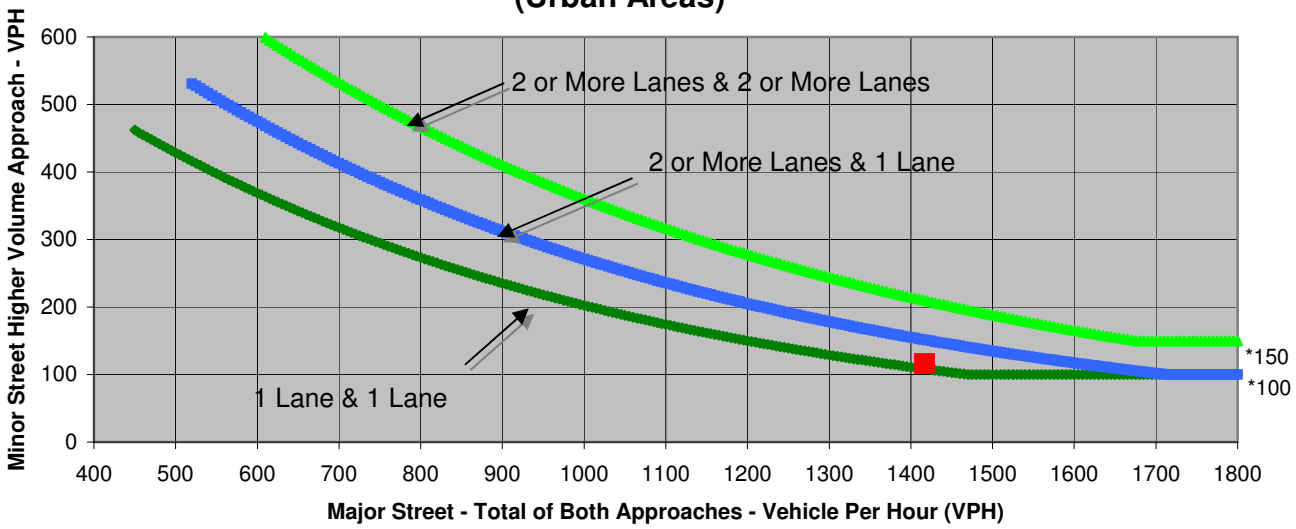
Turn Movement Volumes

	NB	SB	EB	WB
Left	52	0	35	0
Through	572	768	0	0
Right	0	25	81	0
Total	624	793	116	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Daniels Street	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,417	116	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 120 EB
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

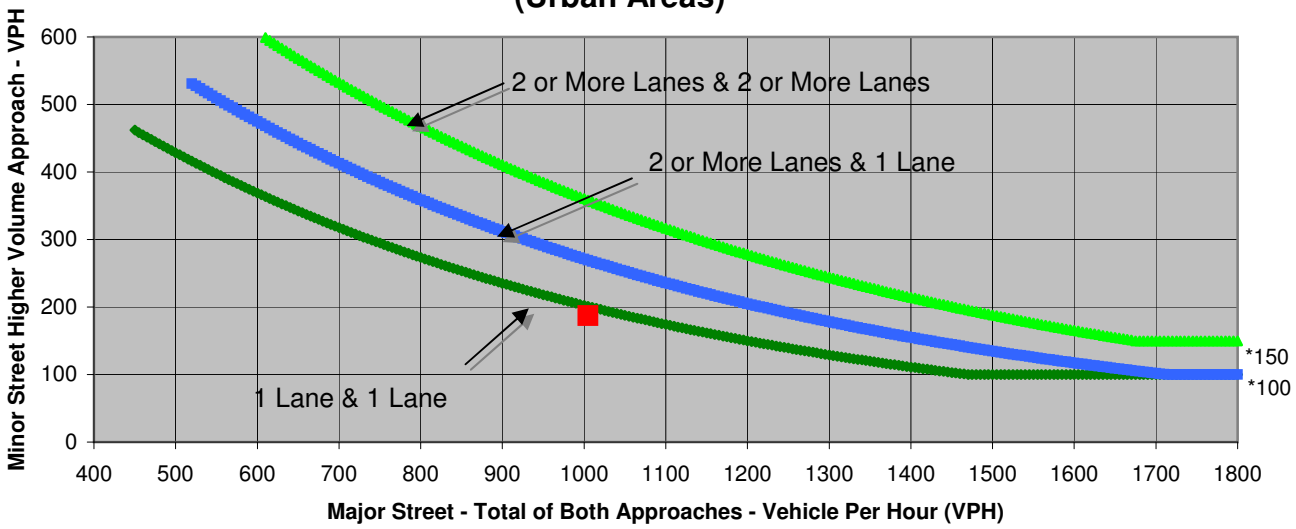
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	215	120	0
Through	337	374	0	0
Right	79	0	67	0
Total	416	589	187	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 EB	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	1,005	187	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 120 WB

Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

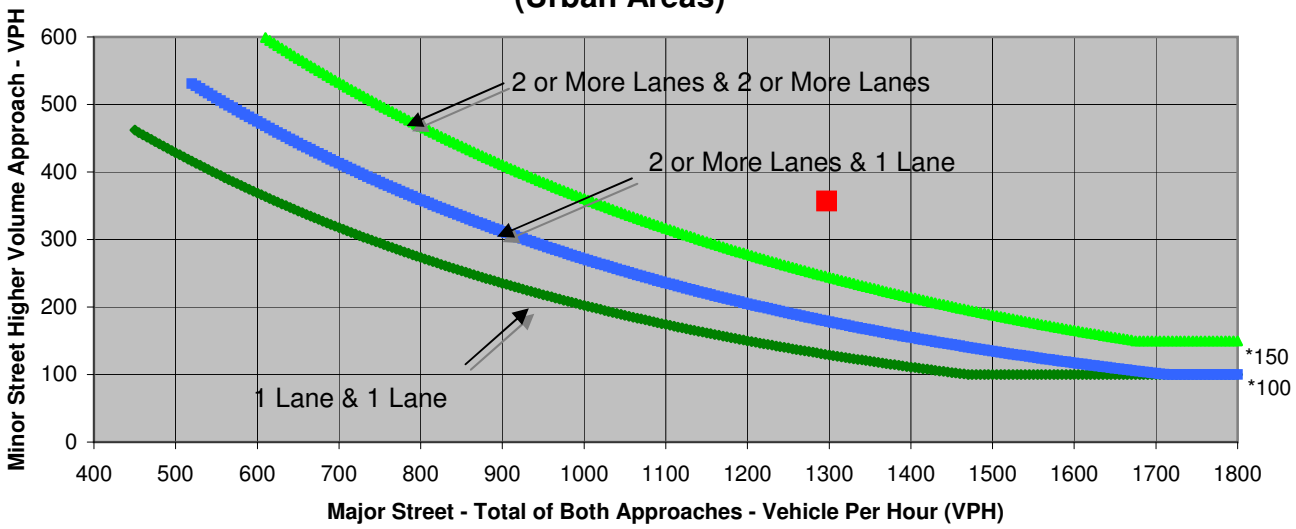
Turn Movement Volumes

	NB	SB	EB	WB
Left	69	0	0	112
Through	386	477	0	0
Right	0	365	0	245
Total	455	842	0	357

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 WB	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	1,297	357	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

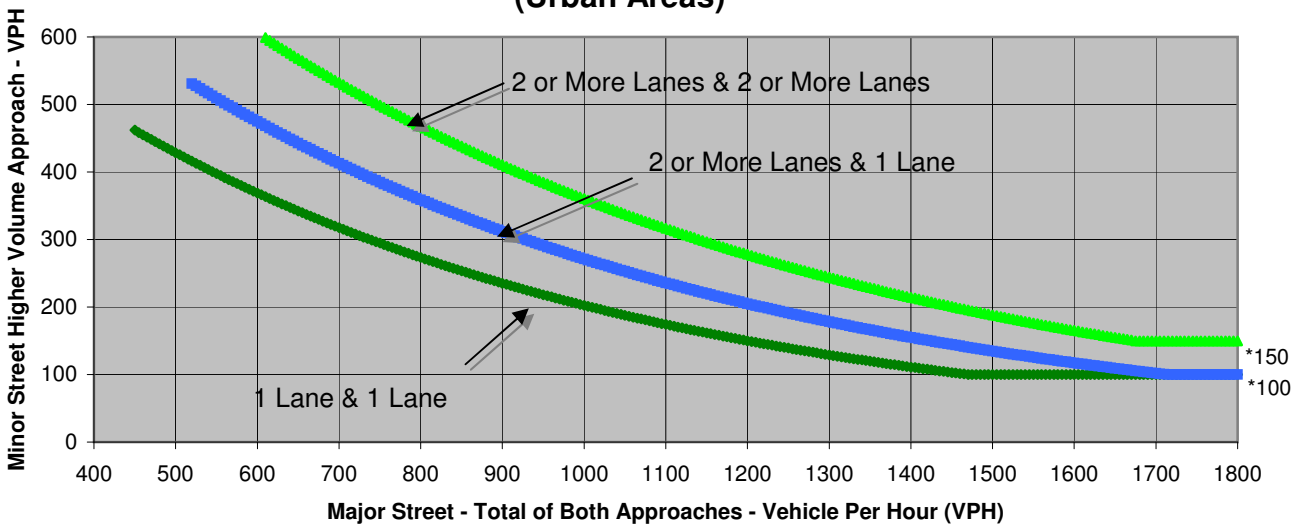
Turn Movement Volumes

	NB	SB	EB	WB
Left	4	37	14	36
Through	172	150	41	35
Right	28	7	4	71
Total	204	194	59	142

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	2	2	NO
Traffic Volume (VPH) *	398	142	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 120 EB
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

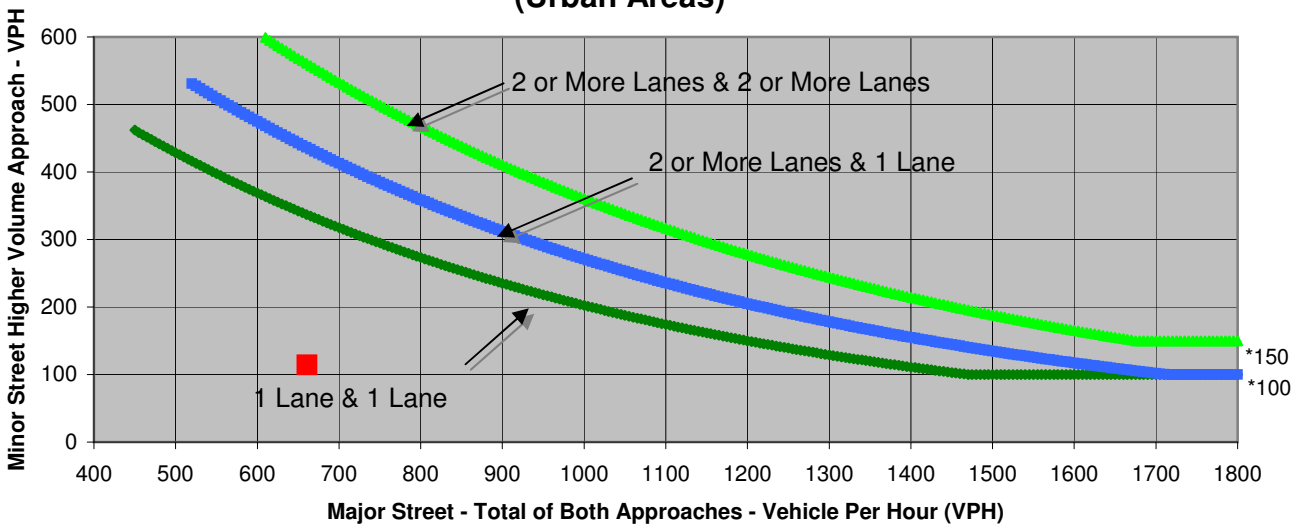
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	107	104	0
Through	323	139	0	0
Right	92	0	10	0
Total	415	246	114	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 EB	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	661	114	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 120 WB
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	AM

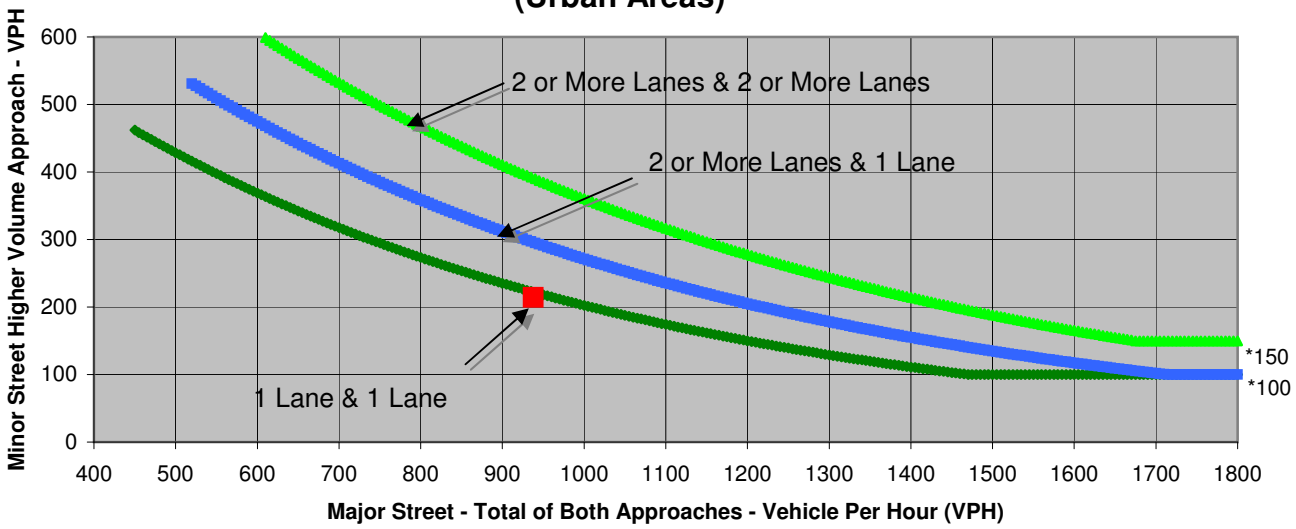
Turn Movement Volumes

	NB	SB	EB	WB
Left	109	0	0	30
Through	318	216	0	0
Right	0	295	0	184
Total	427	511	0	214

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

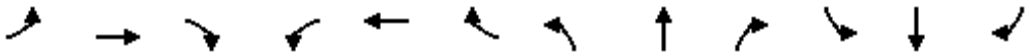


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 120 WB	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	938	214	

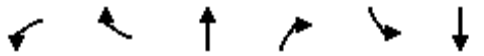
* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.93		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3491		1770	3280		1770	1827	1583	1770	1789	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3491		1770	3280		1770	1827	1583	1770	1789	
Volume (vph)	37	221	22	101	158	151	70	201	94	212	245	47
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	40	240	24	110	172	164	78	223	104	223	258	49
RTOR Reduction (vph)	0	8	0	0	133	0	0	0	64	0	5	0
Lane Group Flow (vph)	40	256	0	110	203	0	78	223	40	223	302	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	4.6	12.3		8.7	16.4		7.5	33.0	33.0	15.4	40.9	
Effective Green, g (s)	4.6	12.3		8.7	16.4		7.5	33.0	33.0	15.4	40.9	
Actuated g/C Ratio	0.05	0.14		0.10	0.19		0.09	0.39	0.39	0.18	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	95	503		180	630		155	706	612	319	857	
v/s Ratio Prot	0.02	c0.07		c0.06	0.06		0.04	0.12		c0.13	c0.17	
v/s Ratio Perm									0.03			
v/c Ratio	0.42	0.51		0.61	0.32		0.50	0.32	0.07	0.70	0.35	
Uniform Delay, d1	39.1	33.8		36.7	29.7		37.2	18.3	16.5	32.8	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.8		6.0	0.3		2.6	1.2	0.2	6.6	1.1	
Delay (s)	42.1	34.6		42.7	30.0		39.7	19.5	16.7	39.4	15.1	
Level of Service	D	C		D	C		D	B	B	D	B	
Approach Delay (s)		35.6			33.2			22.7			25.3	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

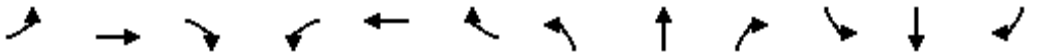
c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	49	40	326	80	39	329
Peak Hour Factor	0.85	0.85	0.90	0.90	0.95	0.95
Hourly flow rate (vph)	58	47	362	89	41	346
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.89	0.89			0.89	
vC, conflicting volume	837	411			453	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	816	335			383	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	80	92			96	
cM capacity (veh/h)	294	624			1040	

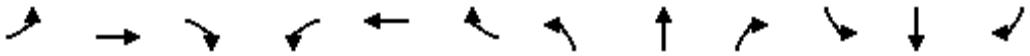
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	105	451	387
Volume Left	58	0	41
Volume Right	47	89	0
cSH	386	1700	1040
Volume to Capacity	0.27	0.27	0.04
Queue Length 95th (ft)	27	0	3
Control Delay (s)	17.8	0.0	1.3
Lane LOS	C		A
Approach Delay (s)	17.8	0.0	1.3
Approach LOS	C		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1561	3433	1863	1562	1770	3471	1549	1770	1827	1549
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1561	3433	1863	1562	1770	3471	1549	1770	1827	1549
Volume (vph)	27	13	69	141	28	16	69	363	70	9	305	64
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	32	15	81	166	33	19	77	403	78	9	321	67
RTOR Reduction (vph)	0	0	59	0	0	15	0	0	47	0	0	46
Lane Group Flow (vph)	32	15	22	166	33	4	77	403	31	9	321	21
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		pm+ov	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.8	10.6	16.5	8.9	12.7	12.7	5.9	23.7	23.7	0.6	18.4	18.4
Effective Green, g (s)	6.8	10.6	16.5	8.9	12.7	12.7	5.9	23.7	23.7	0.6	18.4	18.4
Actuated g/C Ratio	0.11	0.18	0.28	0.15	0.21	0.21	0.10	0.40	0.40	0.01	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	390	330	535	511	396	332	175	1376	614	18	562	477
v/s Ratio Prot	0.01	0.01	0.00	c0.05	c0.02		c0.04	0.12		0.01	c0.18	
v/s Ratio Perm			0.01			0.00			0.02			0.01
v/c Ratio	0.08	0.05	0.04	0.32	0.08	0.01	0.44	0.29	0.05	0.50	0.57	0.04
Uniform Delay, d1	23.7	20.4	15.9	22.8	18.9	18.6	25.4	12.3	11.1	29.5	17.4	14.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.01	0.99	0.93	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0	0.4	0.1	0.0	1.8	0.1	0.0	20.2	1.4	0.0
Delay (s)	23.8	20.5	15.9	23.1	19.0	18.6	27.4	12.3	10.4	49.6	18.8	14.6
Level of Service	C	C	B	C	B	B	C	B	B	D	B	B
Approach Delay (s)		18.4			22.1			14.1			18.8	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	59.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

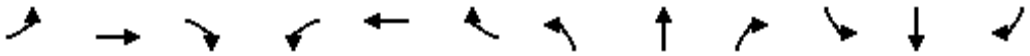


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	30	0	184	109	318	0	0	220	295
Peak Hour Factor	0.25	0.25	0.25	0.65	0.65	0.65	0.80	0.80	0.80	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	46	0	283	136	398	0	0	244	328
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											494	
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	1361	1078	408	1078	1242	398	572			398		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1421	1091	310	1091	1282	398	501			398		
tC, single (s)	7.1	6.5	6.2	*6.4	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	75	100	56	85			100		
cM capacity (veh/h)	49	157	626	182	121	639	912			1161		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	329	136	398	572
Volume Left	46	136	0	0
Volume Right	283	0	0	328
cSH	472	912	1700	1700
Volume to Capacity	0.70	0.15	0.23	0.34
Queue Length 95th (ft)	133	13	0	0
Control Delay (s)	28.3	9.6	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	28.3	2.5		0.0
Approach LOS	D			

Intersection Summary				
Average Delay	7.4			
Intersection Capacity Utilization	58.7%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	104	0	10	0	0	0	0	323	92	111	139	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.80	0.80	0.80
Hourly flow rate (vph)	116	0	11	0	0	0	0	359	102	139	174	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	861	912	174	872	861	410	174			461		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	861	912	174	872	861	410	174			461		
tC, single (s)	*6.5	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	59	100	99	100	100	100	100			87		
cM capacity (veh/h)	285	238	870	241	255	642	1403			1069		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	127	461	139	174
Volume Left	116	0	139	0
Volume Right	11	102	0	0
cSH	303	1700	1069	1700
Volume to Capacity	0.42	0.27	0.13	0.10
Queue Length 95th (ft)	49	0	11	0
Control Delay (s)	25.2	0.0	8.9	0.0
Lane LOS	D		A	
Approach Delay (s)	25.2	0.0	3.9	
Approach LOS	D			

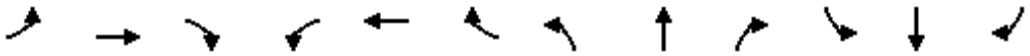
Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	58.7%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	147	2	5	5	1	87	6	181	3	22	101	26
Peak Hour Factor	0.85	0.85	0.85	0.75	0.75	0.75	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	173	2	6	7	1	116	8	226	4	28	126	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	481	426	126	427	455	226	159			230		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	481	426	126	427	455	226	159			230		
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 %	58	100	99	99	100	86	99			98		
cM capacity (veh/h)	415	507	924	522	488	813	1421			1338		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	181	7	117	8	226	4	28	126	32
Volume Left	173	7	0	8	0	0	28	0	0
Volume Right	6	0	116	0	0	4	0	0	32
cSH	431	522	822	1421	1700	1700	1338	1700	1700
Volume to Capacity	0.42	0.01	0.14	0.01	0.13	0.00	0.02	0.07	0.02
Queue Length 95th (ft)	51	1	12	0	0	0	2	0	0
Control Delay (s)	19.4	12.0	10.2	7.5	0.0	0.0	7.7	0.0	0.0
Lane LOS	C	B	B	A			A		
Approach Delay (s)	19.4	10.3		0.2			1.1		
Approach LOS	C	B							

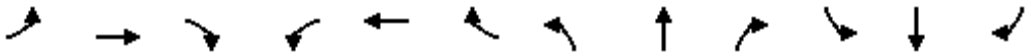
Intersection Summary				
Average Delay	6.9			
Intersection Capacity Utilization	37.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	20	19	1	16	25	13	121	3	35	70	38
Peak Hour Factor	0.60	0.60	0.60	0.65	0.65	0.65	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	75	33	32	2	25	38	15	142	4	41	82	45

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	140	65	161	168
Volume Left (vph)	75	2	15	41
Volume Right (vph)	32	38	4	45
Hadj (s)	0.01	-0.32	0.04	-0.08
Departure Headway (s)	4.8	4.6	4.6	4.5
Degree Utilization, x	0.19	0.08	0.21	0.21
Capacity (veh/h)	700	720	735	749
Control Delay (s)	8.9	8.0	8.9	8.7
Approach Delay (s)	8.9	8.0	8.9	8.7
Approach LOS	A	A	A	A

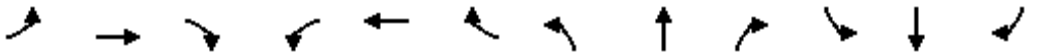
Intersection Summary			
Delay	8.7		
HCM Level of Service	A		
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3391		1770	3294		1770	3332	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3391		1770	3294		1770	3332	
Volume (vph)	121	163	121	61	169	65	160	308	55	67	326	209
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	132	177	132	66	184	71	188	362	65	74	362	232
RTOR Reduction (vph)	0	0	103	0	57	0	0	15	0	0	109	0
Lane Group Flow (vph)	132	177	29	66	198	0	188	412	0	74	485	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.3	15.1	15.1	3.3	11.1		9.2	31.0		4.4	26.2	
Effective Green, g (s)	7.3	15.1	15.1	3.3	11.1		9.2	31.0		4.4	26.2	
Actuated g/C Ratio	0.10	0.22	0.22	0.05	0.16		0.13	0.44		0.06	0.38	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	403	342	84	539		233	1463		112	1251	
v/s Ratio Prot	c0.07	c0.10		0.04	0.06		c0.11	0.13		0.04	c0.15	
v/s Ratio Perm			0.02									
v/c Ratio	0.71	0.44	0.08	0.79	0.37		0.81	0.28		0.66	0.39	
Uniform Delay, d1	30.2	23.7	21.8	32.9	26.2		29.4	12.3		32.0	15.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.3	0.8	0.1	37.0	0.4		18.2	0.5		13.7	0.9	
Delay (s)	42.5	24.5	21.9	69.9	26.6		47.6	12.8		45.6	16.8	
Level of Service	D	C	C	E	C		D	B		D	B	
Approach Delay (s)		29.1			35.5			23.4			20.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	25.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	69.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

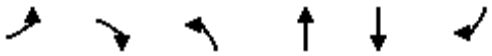
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.93		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1687		1770	1737		1770	3308		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1687		1770	1737		1770	3308		1770	1863	1583
Volume (vph)	55	75	127	152	85	70	84	443	54	75	491	10
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	65	88	149	179	100	82	99	521	64	83	546	11
RTOR Reduction (vph)	0	99	0	0	45	0	0	12	0	0	0	10
Lane Group Flow (vph)	65	138	0	179	137	0	99	573	0	83	546	1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	3.4	12.3		7.0	15.9		4.7	24.2		4.6	24.1	3.4
Effective Green, g (s)	3.4	12.3		7.0	15.9		4.7	24.2		4.6	24.1	3.4
Actuated g/C Ratio	0.05	0.19		0.11	0.25		0.07	0.38		0.07	0.38	0.05
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	94	324		193	431		130	1249		127	700	84
v/s Ratio Prot	0.04	c0.08		c0.10	c0.08		c0.06	0.17		0.05	c0.29	0.00
v/s Ratio Perm												
v/c Ratio	0.69	0.43		0.93	0.32		0.76	0.46		0.65	0.78	0.01
Uniform Delay, d1	29.8	22.8		28.3	19.7		29.1	15.0		29.0	17.7	28.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Incremental Delay, d2	19.7	0.9		44.2	0.4		22.8	1.2		11.5	8.4	0.0
Delay (s)	49.5	23.7		72.5	20.1		51.9	16.1		40.4	26.1	28.8
Level of Service	D	C		E	C		D	B		D	C	C
Approach Delay (s)		29.3			46.1			21.3			28.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		

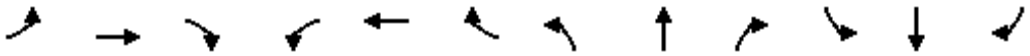
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	35	82	53	572	768	25
Peak Hour Factor	0.92	0.92	0.85	0.85	0.90	0.90
Hourly flow rate (vph)	38	89	62	673	853	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1665	867	881			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1665	867	881			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	61	75	92			
cM capacity (veh/h)	98	352	767			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	127	735	881
Volume Left	38	62	0
Volume Right	89	0	28
cSH	198	767	1700
Volume to Capacity	0.64	0.08	0.52
Queue Length 95th (ft)	94	7	0
Control Delay (s)	51.0	2.1	0.0
Lane LOS	F	A	
Approach Delay (s)	51.0	2.1	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

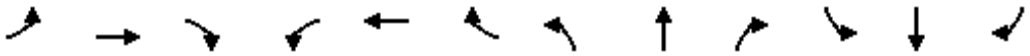


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	104	0	245	69	380	0	0	485	365
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	116	0	272	81	447	0	0	539	406
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1623	1351	742	1351	1554	447	944			447		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1623	1351	742	1351	1554	447	944			447		
tC, single (s)	7.1	6.5	6.2	*6.5	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	21	100	55	89			100		
cM capacity (veh/h)	42	133	416	146	100	611	726			1113		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	388	81	447	944
Volume Left	116	81	0	0
Volume Right	272	0	0	406
cSH	313	726	1700	1700
Volume to Capacity	1.24	0.11	0.26	0.56
Queue Length 95th (ft)	439	9	0	0
Control Delay (s)	165.9	10.6	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	165.9	1.6		0.0
Approach LOS	F			

Intersection Summary				
Average Delay		35.0		
Intersection Capacity Utilization		82.5%	ICU Level of Service	E
Analysis Period (min)		15		

* User Entered Value

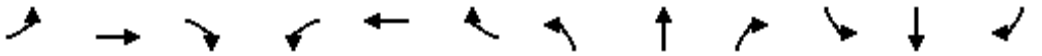


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	120	0	67	0	0	0	0	329	80	215	374	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85
Hourly flow rate (vph)	133	0	74	0	0	0	0	366	89	253	440	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								859				
pX, platoon unblocked	0.97	0.97		0.97	0.97	0.97				0.97		
vC, conflicting volume	1356	1400	440	1430	1356	410	440			454		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1366	1412	440	1442	1366	393	440			439		
tC, single (s)	*6.4	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	88	100	100	100	100			77		
cM capacity (veh/h)	131	103	605	77	110	638	1120			1090		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	208	454	253	440
Volume Left	133	0	253	0
Volume Right	74	89	0	0
cSH	182	1700	1090	1700
Volume to Capacity	1.14	0.27	0.23	0.26
Queue Length 95th (ft)	265	0	22	0
Control Delay (s)	163.4	0.0	9.3	0.0
Lane LOS	F		A	
Approach Delay (s)	163.4	0.0	3.4	
Approach LOS	F			

Intersection Summary				
Average Delay	26.8			
Intersection Capacity Utilization	82.5%	ICU Level of Service	E	
Analysis Period (min)	15			

* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Volume (vph)	134	4	13	2	5	38	28	236	3	38	257	51
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	4	14	2	5	41	30	257	3	41	279	55
RTOR Reduction (vph)	0	0	12	0	0	38	0	0	1	0	0	19
Lane Group Flow (vph)	146	4	2	2	5	3	30	257	2	41	279	36
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	10.1	16.1	16.1	1.2	7.2	7.2	4.1	72.3	72.3	4.4	72.6	72.6
Effective Green, g (s)	10.1	16.1	16.1	1.2	7.2	7.2	4.1	72.3	72.3	4.4	72.6	72.6
Actuated g/C Ratio	0.09	0.15	0.15	0.01	0.07	0.07	0.04	0.66	0.66	0.04	0.66	0.66
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	315	518	232	37	232	182	128	2326	1832	137	2336	1045
v/s Ratio Prot	c0.04	0.00		0.00	c0.00		0.01	0.07		c0.01	c0.08	
v/s Ratio Perm			0.00			0.00			0.00			0.02
v/c Ratio	0.46	0.01	0.01	0.05	0.02	0.01	0.23	0.11	0.00	0.30	0.12	0.03
Uniform Delay, d1	47.4	40.1	40.1	53.8	48.1	48.1	51.4	7.0	6.5	51.3	6.9	6.5
Progression Factor	0.82	0.69	0.54	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95
Incremental Delay, d2	1.1	0.0	0.0	0.6	0.0	0.0	0.9	0.1	0.0	1.2	0.1	0.1
Delay (s)	39.9	27.6	21.7	54.4	48.1	48.1	52.4	7.1	6.5	52.5	7.0	6.2
Level of Service	D	C	C	D	D	D	D	A	A	D	A	A
Approach Delay (s)		38.0			48.4			11.7			11.8	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

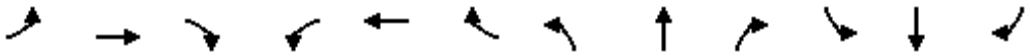
Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.

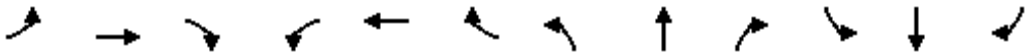
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1491
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1491
Volume (vph)	0	0	0	30	0	209	185	418	0	0	231	283
Peak-hour factor, PHF	0.25	0.25	0.25	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	33	0	232	206	464	0	0	257	314
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	156
Lane Group Flow (vph)	0	0	0	0	33	232	206	464	0	0	257	158
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					1.1	47.3	10.4	38.2			23.8	23.8
Effective Green, g (s)					1.1	47.3	10.4	38.2			23.8	23.8
Actuated g/C Ratio					0.02	1.00	0.22	0.81			0.50	0.50
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					40	1492	382	1447			902	750
v/s Ratio Prot					c0.02		c0.12	c0.26			0.14	
v/s Ratio Perm						0.16						0.11
v/c Ratio					0.82	0.16	0.54	0.32			0.28	0.21
Uniform Delay, d1					23.0	0.0	16.3	1.2			6.8	6.5
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					76.6	0.2	1.5	0.1			0.2	0.1
Delay (s)					99.6	0.2	17.8	1.3			7.0	6.7
Level of Service					F	A	B	A			A	A
Approach Delay (s)		0.0			12.6			6.4			6.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	47.3	Sum of lost time (s)	8.0
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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1516					1799		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1516					1799		1703	1827	
Volume (vph)	252	0	52	0	0	0	0	351	37	142	119	0
Peak-hour factor, PHF	0.80	0.80	0.80	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Adj. Flow (vph)	315	0	65	0	0	0	0	369	39	167	140	0
RTOR Reduction (vph)	0	0	48	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	315	17	0	0	0	0	405	0	167	140	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		16.2	16.2					22.9		9.6	36.5	
Effective Green, g (s)		16.2	16.2					22.9		9.6	36.5	
Actuated g/C Ratio		0.27	0.27					0.38		0.16	0.60	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		455	405					679		269	1099	
v/s Ratio Prot		c0.18						c0.23		c0.10	0.08	
v/s Ratio Perm			0.01									
v/c Ratio		0.69	0.04					0.60		0.62	0.13	
Uniform Delay, d1		20.0	16.5					15.2		23.9	5.2	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		4.5	0.0					1.4		4.4	0.1	
Delay (s)		24.5	16.5					16.6		28.3	5.3	
Level of Service		C	B					B		C	A	
Approach Delay (s)		23.2			0.0			16.6			17.8	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.7	Sum of lost time (s)	12.0
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												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	0	0	388	0	0	171	0
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	0	0	0	0	408	0	0	201	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked												
vC, conflicting volume	610	610	201	610	610	408	201			408		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	610	610	201	610	610	408	201			408		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	407	409	840	407	409	643	1371			1150		

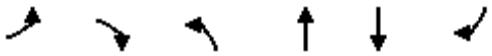
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	408	201
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1371	1150
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	0.0	0.0	0.0	0.0
Approach LOS	A	A		

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	23.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

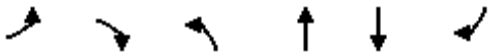
Channelized right turn lanes are not counted.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	0	408	346	95
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	443	376	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				370		
pX, platoon unblocked	0.99					
vC, conflicting volume	649	240	479			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	638	240	479			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	406	761	1079			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	222	222	251	229
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	103
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.13	0.13	0.15	0.13
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

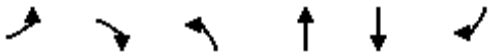
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	15.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	7	0	267	222	51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	8	0	290	241	55
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					310	
pX, platoon unblocked	0.98	0.98	0.98			
vC, conflicting volume	414	148	297			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	387	117	268			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	579	898	1271			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	145	145	161	136
Volume Left	0	0	0	0	0
Volume Right	8	0	0	0	55
cSH	898	1700	1700	1700	1700
Volume to Capacity	0.01	0.09	0.09	0.09	0.08
Queue Length 95th (ft)	1	0	0	0	0
Control Delay (s)	9.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.0	0.0		0.0	
Approach LOS	A				

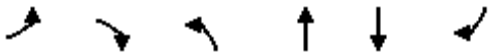
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	17	2	11	249	209	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	2	12	271	227	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					530	
pX, platoon unblocked						
vC, conflicting volume	397	124	249			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	397	124	249			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	99			
cM capacity (veh/h)	575	903	1314			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	18	2	12	135	135	151	97
Volume Left	18	0	12	0	0	0	0
Volume Right	0	2	0	0	0	0	22
cSH	575	903	1314	1700	1700	1700	1700
Volume to Capacity	0.03	0.00	0.01	0.08	0.08	0.09	0.06
Queue Length 95th (ft)	2	0	1	0	0	0	0
Control Delay (s)	11.5	9.0	7.8	0.0	0.0	0.0	0.0
Lane LOS	B	A	A				
Approach Delay (s)	11.2		0.3			0.0	
Approach LOS	B						

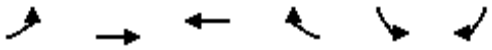
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	2	0	260	196	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2	0	283	213	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					720	
pX, platoon unblocked						
vC, conflicting volume	362	114	228			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	362	114	228			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	610	917	1337			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	141	141	142	86
Volume Left	0	0	0	0	0
Volume Right	2	0	0	0	15
cSH	917	1700	1700	1700	1700
Volume to Capacity	0.00	0.08	0.08	0.08	0.05
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.9	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	8.9	0.0		0.0	
Approach LOS	A				

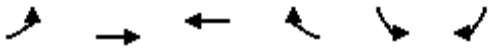
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	15.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	63	45	5	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	68	49	5	0	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	54				86	27
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	54				86	27
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1549				906	1042

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	34	34	33	22	1
Volume Left	0	0	0	0	0
Volume Right	0	0	0	5	1
cSH	1700	1700	1700	1700	1042
Volume to Capacity	0.02	0.02	0.02	0.01	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	8.5
Lane LOS					A
Approach Delay (s)	0.0		0.0		8.5
Approach LOS					A

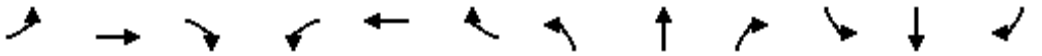
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	0	8	9	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	10	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			451			
pX, platoon unblocked						
vC, conflicting volume	9				4	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	9				4	4
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1610				1016	1077

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	0	0	0	9	10	0
Volume Left	0	0	0	0	10	0
Volume Right	0	0	0	9	0	0
cSH	1700	1700	1700	1700	1016	1700
Volume to Capacity	0.00	0.00	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	0	0	0	1	0
Control Delay (s)	0.0	0.0	0.0	0.0	8.6	0.0
Lane LOS					A	A
Approach Delay (s)	0.0		0.0		8.6	
Approach LOS					A	

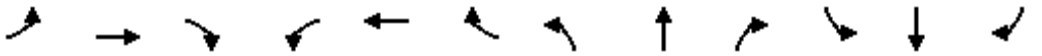
Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	9	0	5	8	10	0	0	2	19	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)	0	10	0	5	9	11	0	0	2	21	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	20			10			25	40	5	32	35	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	20			10			25	40	5	32	35	10
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	100
cM capacity (veh/h)	1595			1608			980	848	1077	967	854	1069

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	5	5	5	6	14	2	21
Volume Left	0	0	5	0	0	0	21
Volume Right	0	0	0	0	11	2	0
cSH	1700	1700	1608	1700	1700	1077	967
Volume to Capacity	0.00	0.00	0.00	0.00	0.01	0.00	0.02
Queue Length 95th (ft)	0	0	0	0	0	0	2
Control Delay (s)	0.0	0.0	7.2	0.0	0.0	8.4	8.8
Lane LOS			A			A	A
Approach Delay (s)	0.0		1.6			8.4	8.8
Approach LOS						A	A

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95		0.97	0.95			1.00	1.00		1.00	
Frt		1.00		1.00	0.91			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.97	
Satd. Flow (prot)		3539		3433	3233			1863	1583		1799	
Flt Permitted		1.00		0.95	1.00			1.00	1.00		0.97	
Satd. Flow (perm)		3539		3433	3233			1863	1583		1799	
Volume (vph)	0	30	0	30	23	31	0	25	58	63	26	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	33	0	33	25	34	0	27	63	68	28	0
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	48	0	0	0
Lane Group Flow (vph)	0	33	0	33	39	0	0	27	15	0	96	0
Turn Type	Prot			Prot			Split		Perm	Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases									2			6
Actuated Green, G (s)		5.8		36.2	46.0			26.0	26.0		26.0	
Effective Green, g (s)		5.8		36.2	46.0			26.0	26.0		26.0	
Actuated g/C Ratio		0.05		0.33	0.42			0.24	0.24		0.24	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		187		1130	1352			440	374		425	
v/s Ratio Prot		c0.01		0.01	c0.01			c0.01			c0.05	
v/s Ratio Perm									0.01			
v/c Ratio		0.18		0.03	0.03			0.06	0.04		0.23	
Uniform Delay, d1		49.8		25.0	18.8			32.5	32.4		33.9	
Progression Factor		1.00		0.61	0.34			1.00	1.00		1.00	
Incremental Delay, d2		0.5		0.0	0.0			0.3	0.2		1.2	
Delay (s)		50.3		15.4	6.5			32.8	32.6		35.1	
Level of Service		D		B	A			C	C		D	
Approach Delay (s)		50.3			9.7			32.6			35.1	
Approach LOS		D			A			C			D	

Intersection Summary			
HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec):	100	Critical Vol./Cap.(X):	0.278
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	9.5
Optimal Cycle:	0	Level Of Service:	A

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	2	169	28	28	150	4	7	41	4	36	35	53
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	2	169	28	28	150	4	7	41	4	36	35	53
Added Vol:	0	5	0	9	3	3	7	0	0	0	0	14
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	2	174	28	37	153	7	14	41	4	36	35	67
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	2	174	28	37	153	7	14	41	4	36	35	67
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	2	174	28	37	153	7	14	41	4	36	35	67
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	2	174	28	37	153	7	14	41	4	36	35	67
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	572	626	707	571	624	705	521	563	630	539	583	659
Capacity Analysis Module:												
Vol/Sat:	0.00	0.28	0.04	0.06	0.25	0.01	0.03	0.07	0.01	0.07	0.06	0.10
Crit Moves:		****			****			****				****
Delay/Veh:	8.8	10.2	7.7	9.1	9.9	7.6	9.3	9.1	8.0	9.4	8.8	8.3
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.8	10.2	7.7	9.1	9.9	7.6	9.3	9.1	8.0	9.4	8.8	8.3
LOS by Move:	A	B	A	A	A	A	A	A	A	A	A	A
ApproachDel:		9.9			9.7			9.1			8.7	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		9.9			9.7			9.1			8.7	
LOS by Appr:		A			A			A			A	
AllWayAvgQ:	0.0	0.3	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.1	0.1	0.1

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #14

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.51			0.51			0.40			0.45		
P[C2]:	0.21			0.21			0.10			0.05		
P[C3]:	0.18			0.18			0.33			0.37		
P[C4]:	0.09			0.09			0.15			0.12		
P[C5]:	0.01			0.01			0.02			0.01		
Padj[C1]:	0.009			0.009			0.013			0.012		
Padj[C2]:	0.002			0.002			0.006			0.006		
Padj[C3]:	-0.004			-0.004			-0.008			-0.010		
Padj[C4]:	-0.005			-0.005			-0.009			-0.007		
Padj[C5]:	-0.001			-0.001			-0.002			-0.001		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	2	28		37	7		14	4		36	67	
Capacity:	572	707		571	705		521	630		539	659	
DegOfUtil:	0.00	0.04		0.06	0.01		0.03	0.01		0.06	0.09	
DepHeadway:	6.03	4.83		6.04	4.84		6.45	5.25		6.30	5.10	
ServiceTime:	3.7	2.5		3.7	2.5		4.2	3.0		4.0	2.8	
Delay:	8.8	7.7		9.1	7.6		9.3	8.0		9.4	8.3	
Queue:	0.0	0.0		0.1	0.0		0.0	0.0		0.1	0.1	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	174			153			41			35		
Capacity:	626			624			563			583		
DegOfUtil:	0.27			0.24			0.07			0.06		
DepHeadway:	5.53			5.54			5.95			5.80		
ServiceTime:	3.2			3.2			3.7			3.5		
Delay:	10.2			9.9			9.1			8.8		
Queue:	0.3			0.3			0.1			0.1		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	9.9			9.7			9.1			8.7		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.9			9.7			9.1			8.7		
LOS by Appr:	A			A			A			A		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	9.5
OverallLOS:	A

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	2	174	28	37	153	7	14	41	4	36	35	67

Major Street Volume: 401
Minor Approach Volume: 138
Minor Approach Volume Threshold: 767

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec):	100	Critical Vol./Cap.(X):	0.394
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	10.3
Optimal Cycle:	0	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	34	233	12	53	84	34	18	44	27	7	69	137
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	34	233	12	53	84	34	18	44	27	7	69	137
Added Vol:	0	0	0	0	0	0	0	4	0	0	7	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	34	233	12	53	84	34	18	48	27	7	76	137
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	34	233	12	53	84	34	18	48	27	7	76	137
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	34	233	12	53	84	34	18	48	27	7	76	137
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	34	233	12	53	84	34	18	48	27	7	76	137
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	542	592	661	517	559	623	490	526	586	515	557	627
Capacity Analysis Module:												
Vol/Sat:	0.06	0.39	0.02	0.10	0.15	0.05	0.04	0.09	0.05	0.01	0.14	0.22
Crit Moves:		****			****			****				****
Delay/Veh:	9.4	12.1	7.9	10.0	9.8	8.4	9.8	9.6	8.6	9.4	9.7	9.5
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.4	12.1	7.9	10.0	9.8	8.4	9.8	9.6	8.6	9.4	9.7	9.5
LOS by Move:	A	B	A	A	A	A	A	A	A	A	A	A
ApproachDel:		11.6			9.6			9.4			9.5	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		11.6			9.6			9.4			9.5	
LOS by Appr:		B			A			A			A	
AllWayAvgQ:	0.1	0.6	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.2

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #18

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.43			0.33			0.29			0.36		
P[C2]:	0.15			0.25			0.13			0.06		
P[C3]:	0.27			0.21			0.32			0.39		
P[C4]:	0.13			0.19			0.22			0.17		
P[C5]:	0.01			0.02			0.04			0.02		
Padj[C1]:	0.012			0.013			0.016			0.014		
Padj[C2]:	0.004			0.004			0.007			0.007		
Padj[C3]:	-0.007			-0.004			-0.007			-0.010		
Padj[C4]:	-0.008			-0.011			-0.013			-0.010		
Padj[C5]:	-0.001			-0.002			-0.004			-0.002		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	34	12		53	34		18	27		7	137	
Capacity:	542	661		517	623		490	586		515	627	
DegOfUtil:	0.06	0.02		0.10	0.05		0.03	0.04		0.01	0.21	
DepHeadway:	6.34	5.14		6.58	5.38		6.84	5.64		6.59	5.39	
ServiceTime:	4.0	2.8		4.3	3.1		4.5	3.3		4.3	3.1	
Delay:	9.4	7.9		10.0	8.4		9.8	8.6		9.4	9.5	
Queue:	0.1	0.0		0.1	0.0		0.0	0.0		0.0	0.2	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	233			84			48			76		
Capacity:	592			559			526			557		
DegOfUtil:	0.38			0.14			0.08			0.13		
DepHeadway:	5.84			6.08			6.34			6.09		
ServiceTime:	3.5			3.8			4.0			3.8		
Delay:	12.1			9.8			9.6			9.7		
Queue:	0.6			0.2			0.1			0.1		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	11.6			9.6			9.4			9.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	11.6			9.6			9.4			9.5		
LOS by Appr:	B			A			A			A		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	10.3
OverallLOS:	B

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	34	233	12	53	84	34	18	48	27	7	76	137

Major Street Volume: 450
Minor Approach Volume: 220
Minor Approach Volume Threshold: 717

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Existing Plus Project PM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3316	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	901	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1865	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1865	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.3	mi/h
Number of lanes, N	2	
Density, D	29.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Airport
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Commercial EIR

Flow Inputs and Adjustments

Volume, V	3241	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	881	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1849	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1849	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.5	mi/h
Number of lanes, N	2	
Density, D	29.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3045	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	827	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1738	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1738	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.3	mi/h
Number of lanes, N	2	
Density, D	27.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2799	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	761	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1597	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1597	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.6	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2523	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	686	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1440	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1440	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2407	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	654	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1374	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
Urban Freeway		

LOS and Performance Measures

Flow rate, vp	1374	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2653	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	721	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1514	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1514	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	23.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2289	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	622	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1306	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1306	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2204	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	599	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1258	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1258	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2284	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	607	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1257	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1257	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4950	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1303	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1858	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1858	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.4	mi/h
Number of lanes, N	3	
Density, D	29.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to Lathrop
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2985	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	786	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1681	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1681	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	26.0+	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Lathrop to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	2948	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	776	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1660	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1660	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	25.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4749	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1250	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1783	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1783	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.0	mi/h
Number of lanes, N	3	
Density, D	27.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5029	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1323	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1888	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1888	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.0	mi/h
Number of lanes, N	3	
Density, D	30.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3241	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	461	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3241	461		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	881	144		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3699	591		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v_F - v_R) P_{FD} = 3699$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_i = v_F$	3699	4700	No
$v_o = v_F - v_R$	3108	4700	No
v_R	591	2000	No

$v_{av34} = v_{av34}$ = 0 pc/h (Equation 25-15 or 25-16)

Is $v_{av34} > 2700$ pc/h? No

Is $v_{av34} > 1.5\, v_{12}/2$? No

If yes, v_{12A} = (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3699	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 34.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.481

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2780	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	265	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2780	265		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	755	72		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3173	295		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 3173$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3468	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3173	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_S = 0.411$

Space mean speed in ramp influence area, $S_R = 55.5$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 55.5$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3045	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	732	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3045	732		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	827	229		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3475	938		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3475$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3475	4700	No
$v_{FO} = v - v_R$	2537	4700	No
v_R	938	2000	No

$v_{3 \text{ or } av34} = v_R$ 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3475	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 32.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.512$

Space mean speed in ramp influence area, $S_R = 53.2$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 53.2$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2215	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	584	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2215	584		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	602	159		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2528	651		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2528$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3179	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\ v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2528	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R12} + 0.0078\ v_{RA} - 0.00627\ L = 26.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.380$

Space mean speed in ramp influence area, $S_R = 56.3$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 56.3$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2653	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	632	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2653	632		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	721	166		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3028	682		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3028$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3028	4700	No
$v_{FO} = v - v_R$	2346	4700	No
v_R	682	2000	No

$v_{3 \text{ or } av34} = v_{av34}$ = 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} = v_{av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34} = v_{av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3028	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 28.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.489

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1902	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	385	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1902	385		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	517	105		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2171	429		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2171$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2600	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2171	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A = 22.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.339$

Space mean speed in ramp influence area, $S_R = 57.2$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 57.2$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2289	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	296	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2289	296		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	622	78		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2612	319		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2612$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2612	4700	No
$v_{FO} = v - v_R$	2293	4700	No
v_R	319	2000	No

$v_{3 \text{ or } av34} = v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$? No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2612	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 25.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.457$

Space mean speed in ramp influence area, $S_R = 54.5$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 54.5$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Existing + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1993	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	211	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1993	211		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	542	57		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2275	235		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0

FM
$v_{12} = v_F (P_{FM}) = 2275$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2510	4700	No

$v_{3 \text{ or } av34} = 0$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2275	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_{R12} - 0.00627\, L_A = 21.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.334$

Space mean speed in ramp influence area, $S_R = 57.3$ mph

Space mean speed in outer lanes, $S_0 =$ N/A mph

Space mean speed for all vehicles, $S = 57.3$ mph

Leisch Method for Weaving Analysis

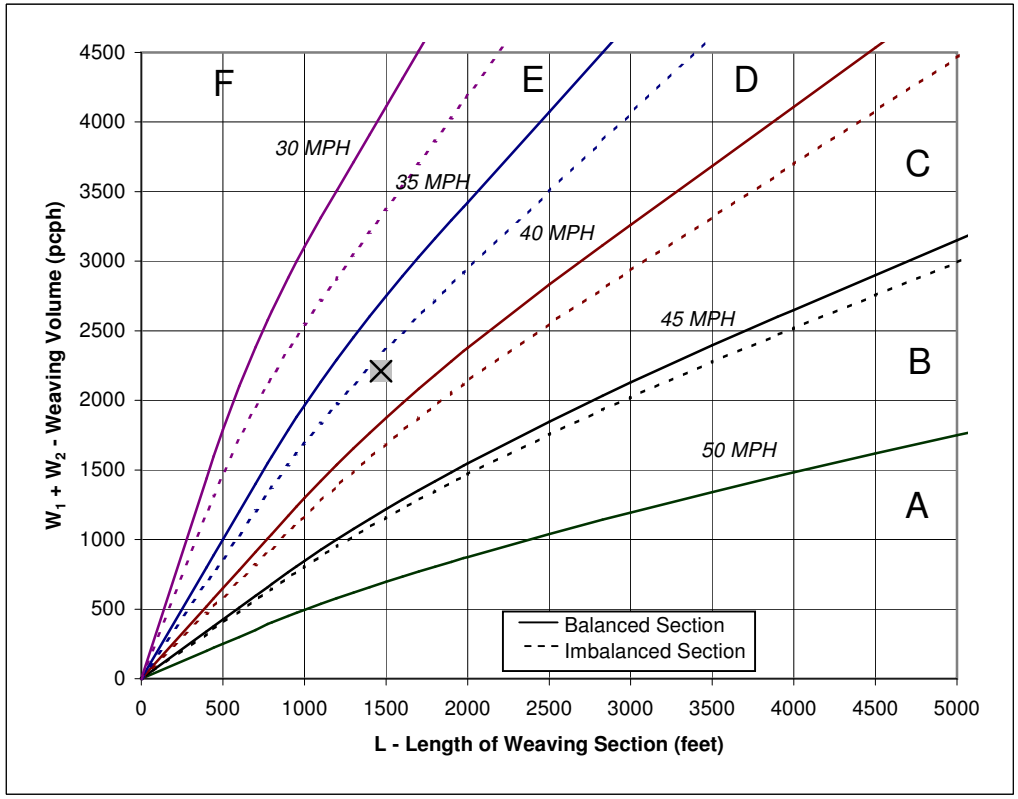
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

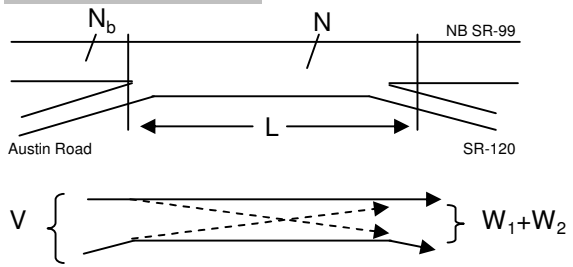
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,820	Volume (vph)*	122	Volume (vph)*	1,984
Truck Percentage	14%	Truck Percentage	6%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	5,157	Volume (pcph)	126	Volume (pcph)	2,083

Project Information

Project	Union Crossing
Scenario	EXISTING + PROJECT - PM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **37.9**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,352**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

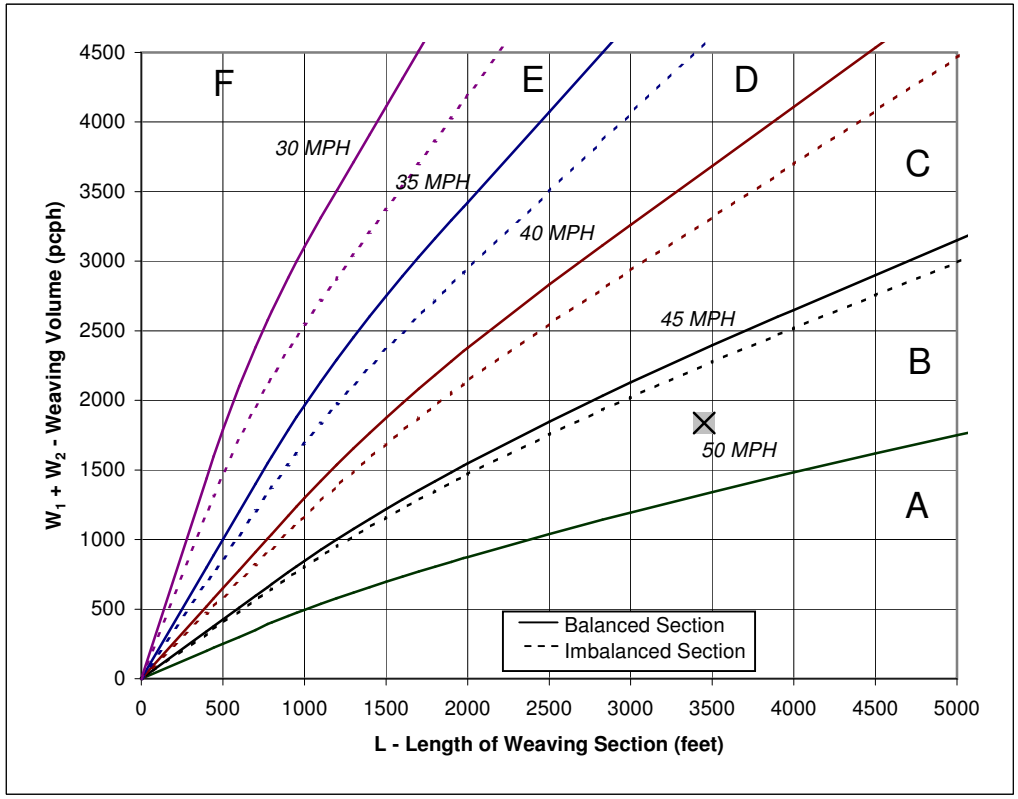
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

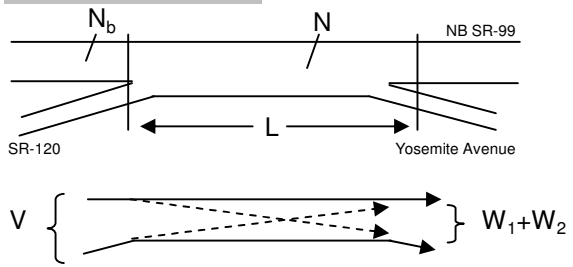
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,593	Volume (vph)*	757	Volume (vph)*	1,012
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,845	Volume (pcph)	795	Volume (pcph)	1,042

Project Information

Project	Union Crossing
Scenario	EXISTING + PROJECT - PM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **47.6**
4. Weaving Intensity Factor (k) **1.58**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,436**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

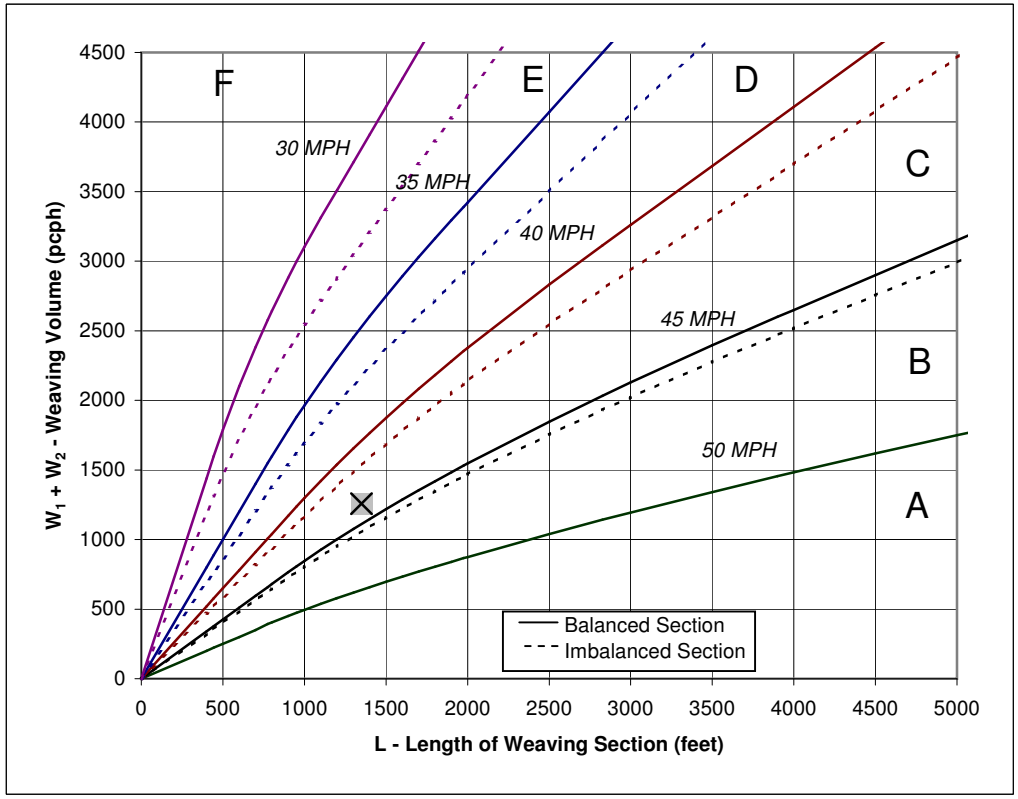
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

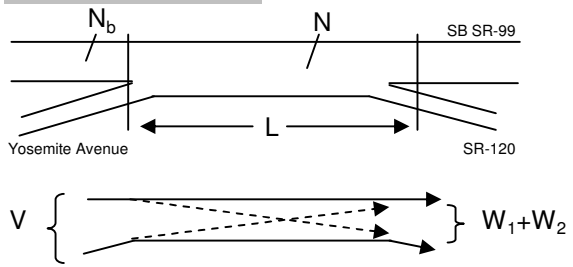
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,406	Volume (vph)*	782	Volume (vph)*	423
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,644	Volume (pcph)	821	Volume (pcph)	436

Project Information

Project	Union Crossing
Scenario	EXISTING + PROJECT - PM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **42.9**
4. Weaving Intensity Factor (k) **2.23**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,394**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Atherton Drive
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

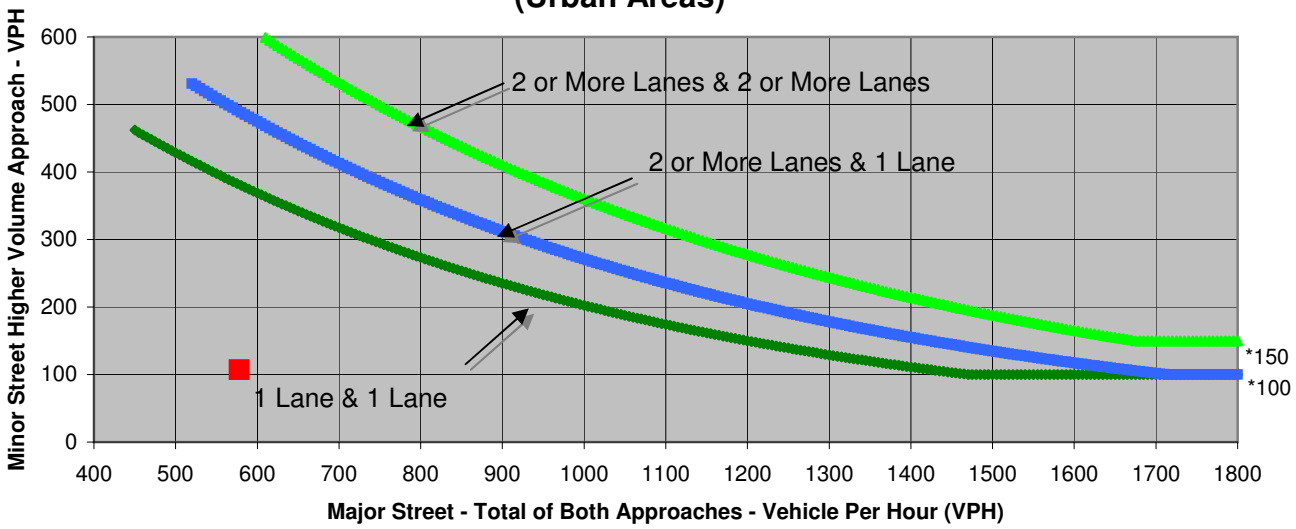
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	92	87	11
Through	140	272	7	3
Right	13	51	13	61
Total	163	415	107	75

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	NO
Traffic Volume (VPH) *	578	107	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 99 EB

Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

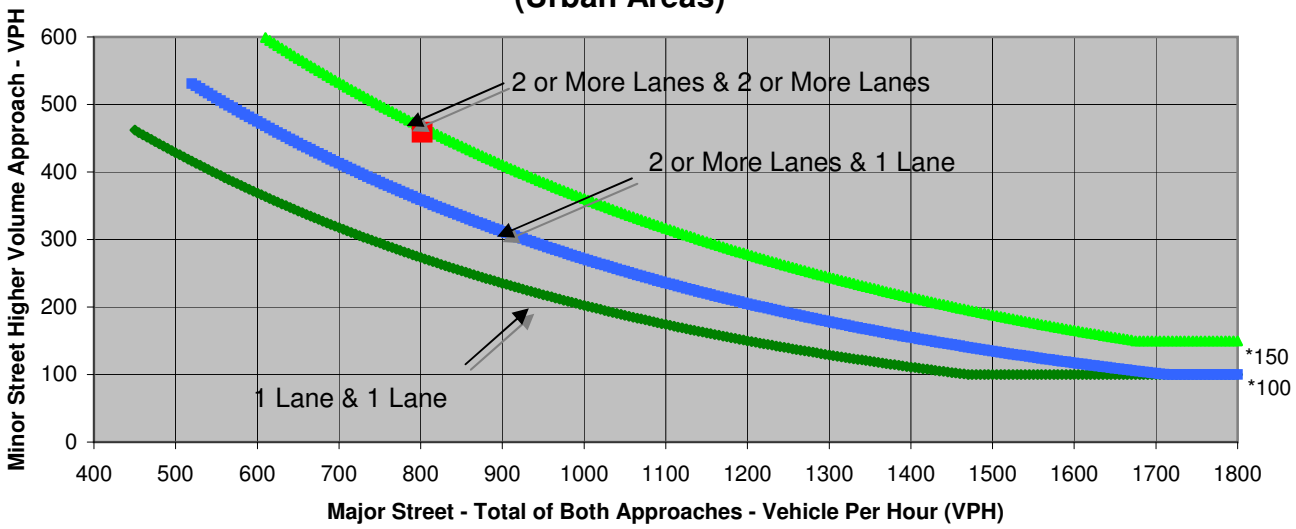
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	218	340	0
Through	234	296	0	0
Right	54	0	119	0
Total	288	514	459	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 99 EB	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	802	459	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	SR 99 WB

Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

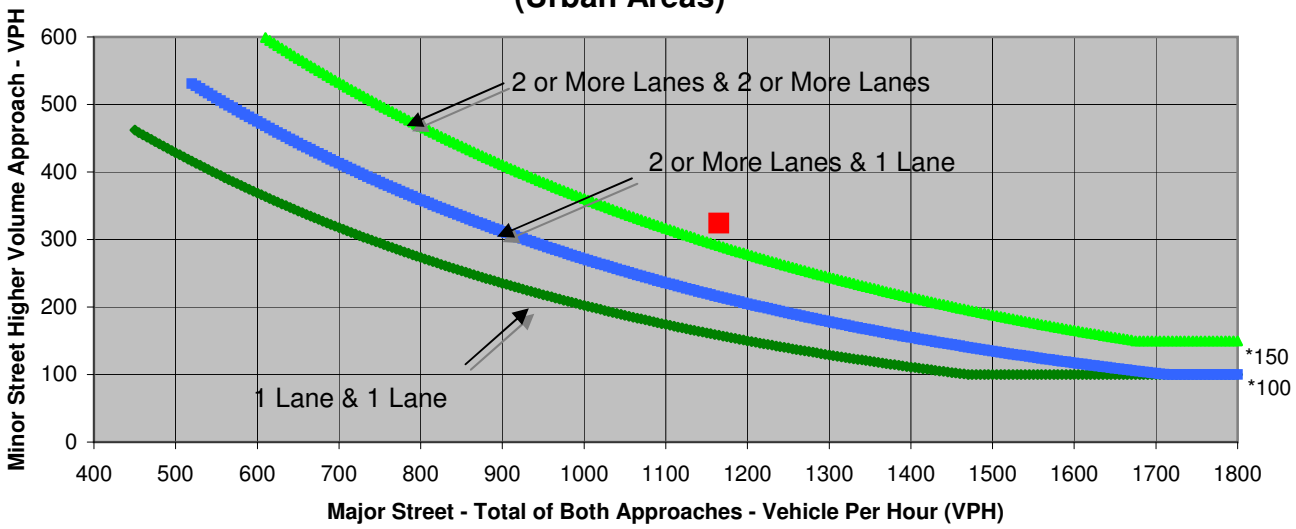
Turn Movement Volumes

	NB	SB	EB	WB
Left	46	13	0	101
Through	528	413	0	0
Right	0	165	0	223
Total	574	591	0	324

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	SR 99 WB	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	1,165	324	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Wawona Street
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

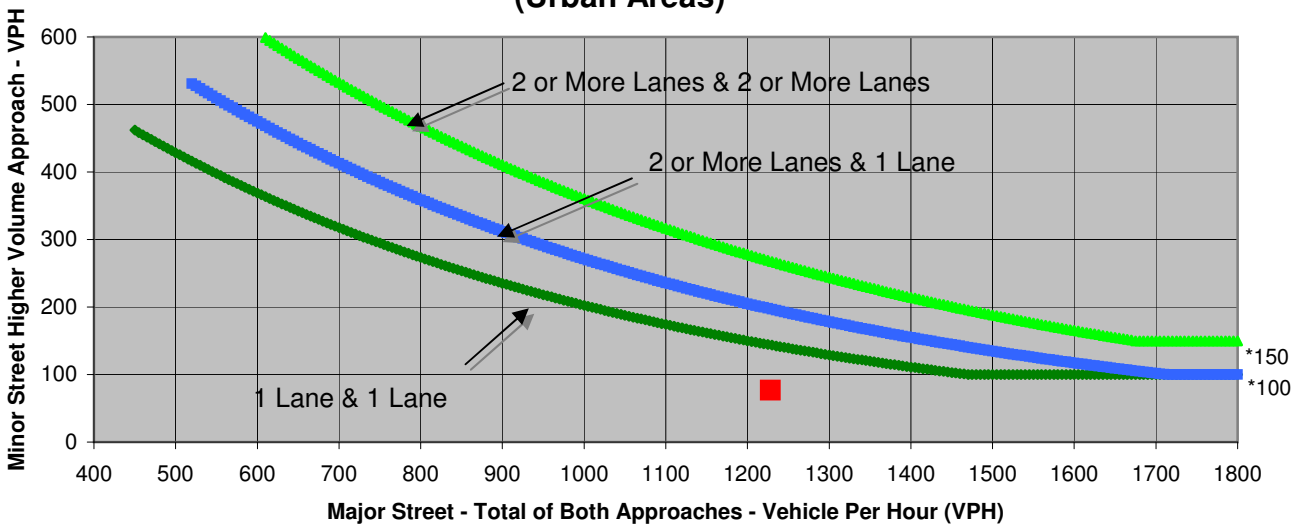
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	76	0	46
Through	506	577	0	0
Right	69	0	0	31
Total	575	653	0	77

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	1,228	77	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

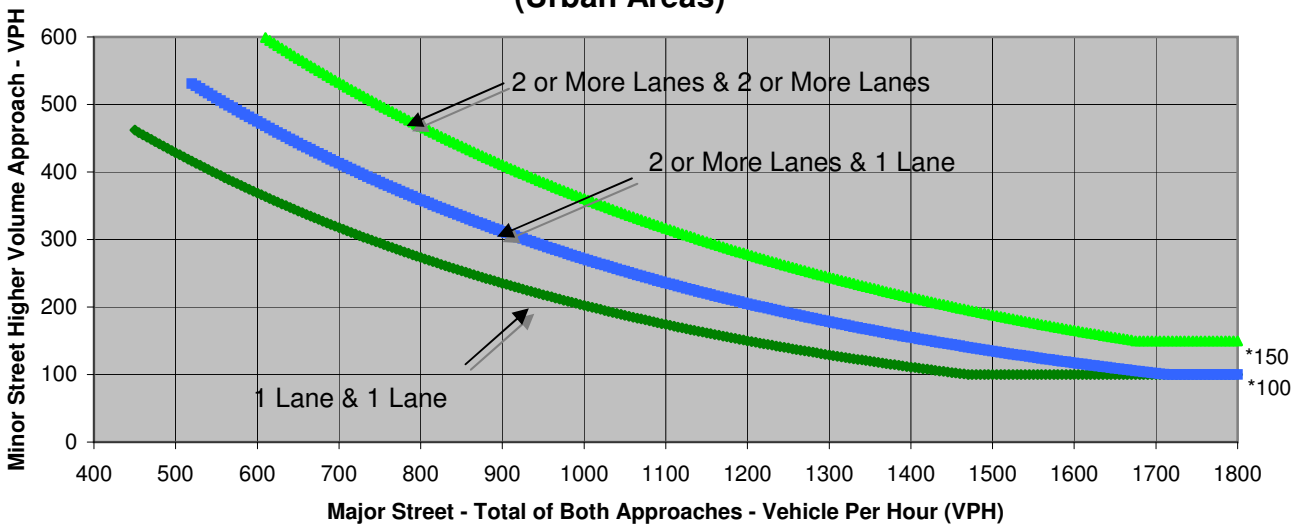
Turn Movement Volumes

	NB	SB	EB	WB
Left	7	55	36	3
Through	82	199	27	27
Right	5	43	4	45
Total	94	297	67	75

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	391	75	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

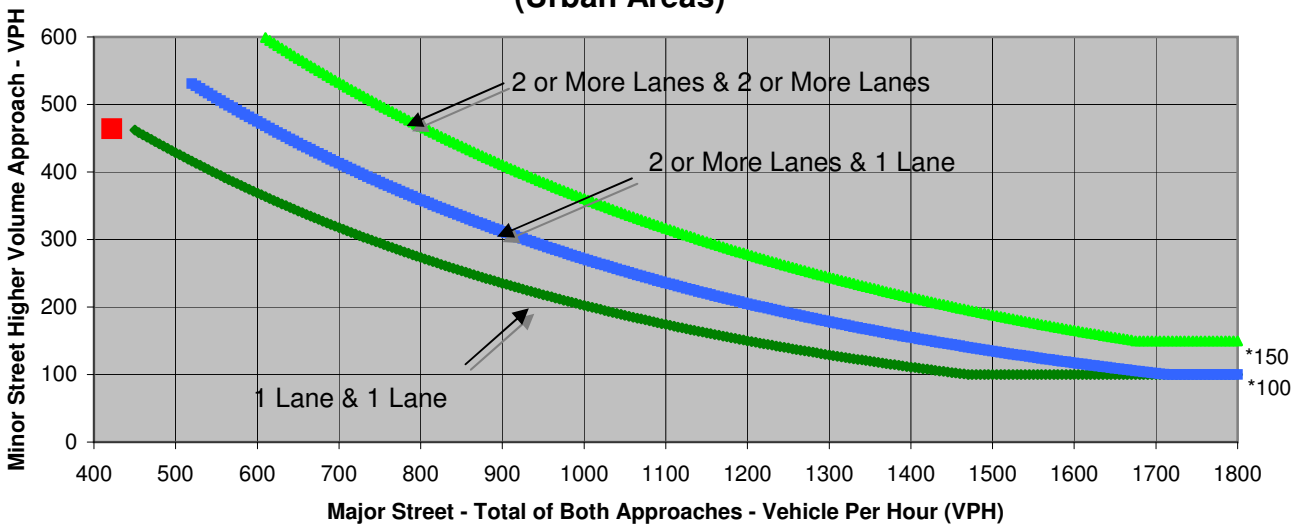
Turn Movement Volumes

	NB	SB	EB	WB
Left	23	209	22	20
Through	160	223	138	86
Right	16	32	49	107
Total	199	464	209	213

Major Street Direction

	North/South
x	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	3	NO
Traffic Volume (VPH) *	422	464	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Project Access
Project	Union Crossing
Scenario	Existing Plus Project
Peak Hour	PM

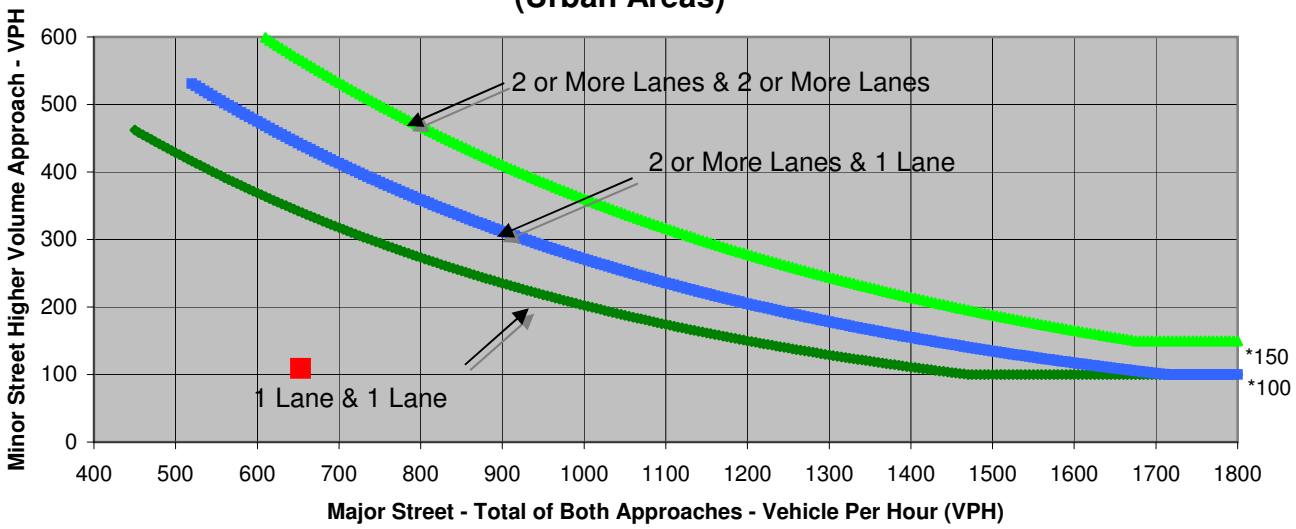
Turn Movement Volumes

	NB	SB	EB	WB
Left	31	0	98	0
Through	219	333	0	0
Right	0	70	11	0
Total	250	403	109	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Project Access	Warrant Met
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	653	109	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Atherton Drive
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

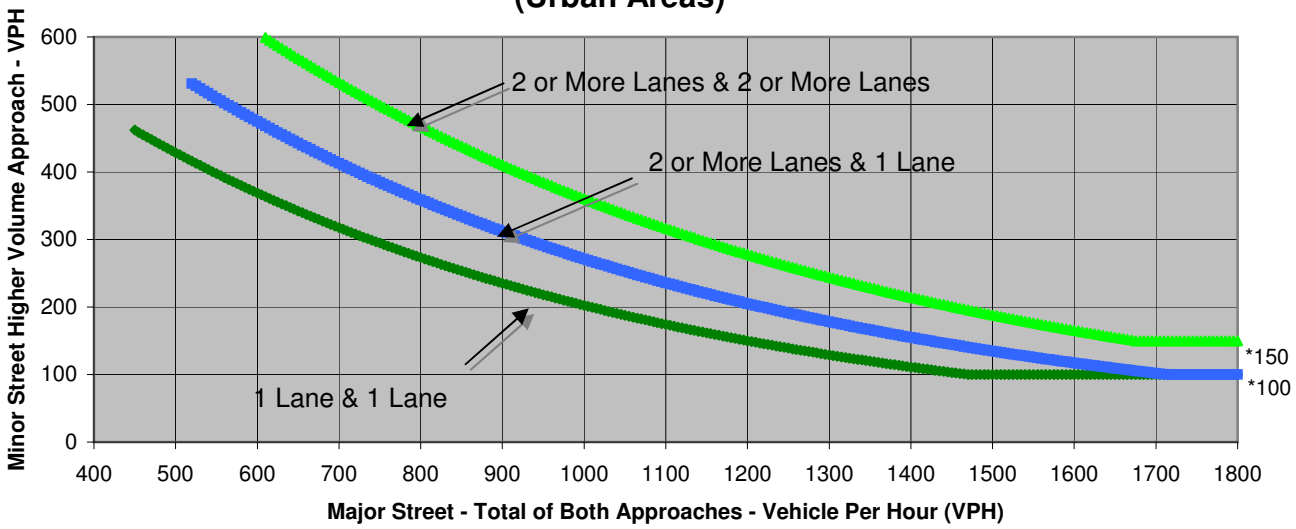
Turn Movement Volumes

	NB	SB	EB	WB
Left	108	31	810	1
Through	183	535	21	20
Right	2	133	43	44
Total	293	699	874	65

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	YES
Traffic Volume (VPH) *	992	874	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Daniels Street
Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

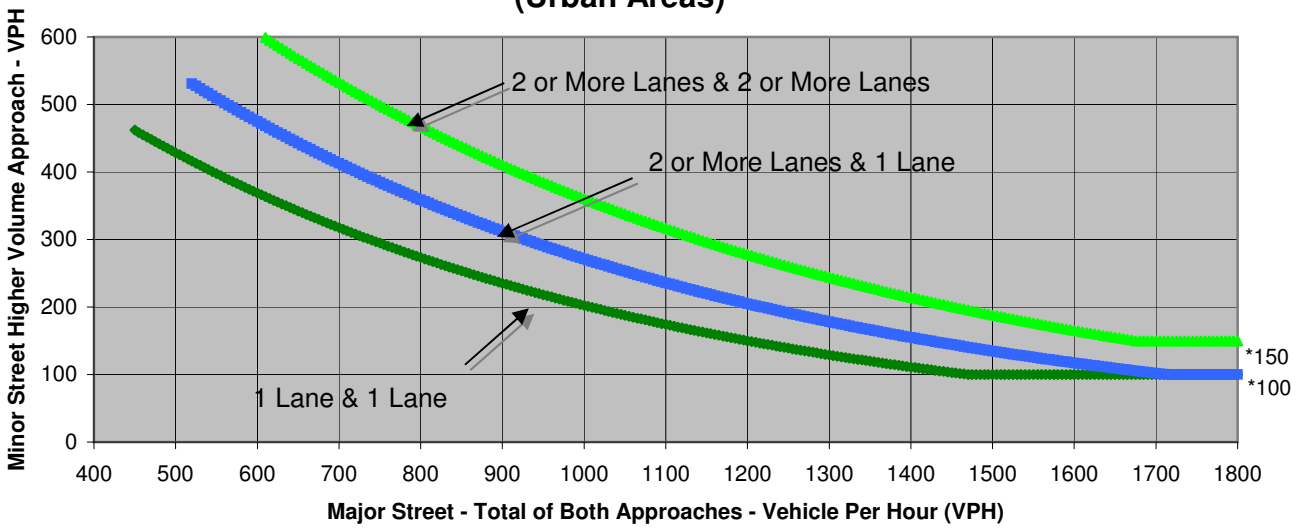
Turn Movement Volumes

	NB	SB	EB	WB
Left	115	0	0	35
Through	1,130	749	0	0
Right	0	35	0	92
Total	1,245	784	0	127

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Daniels Street	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,029	127	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	SR 120 EB

Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

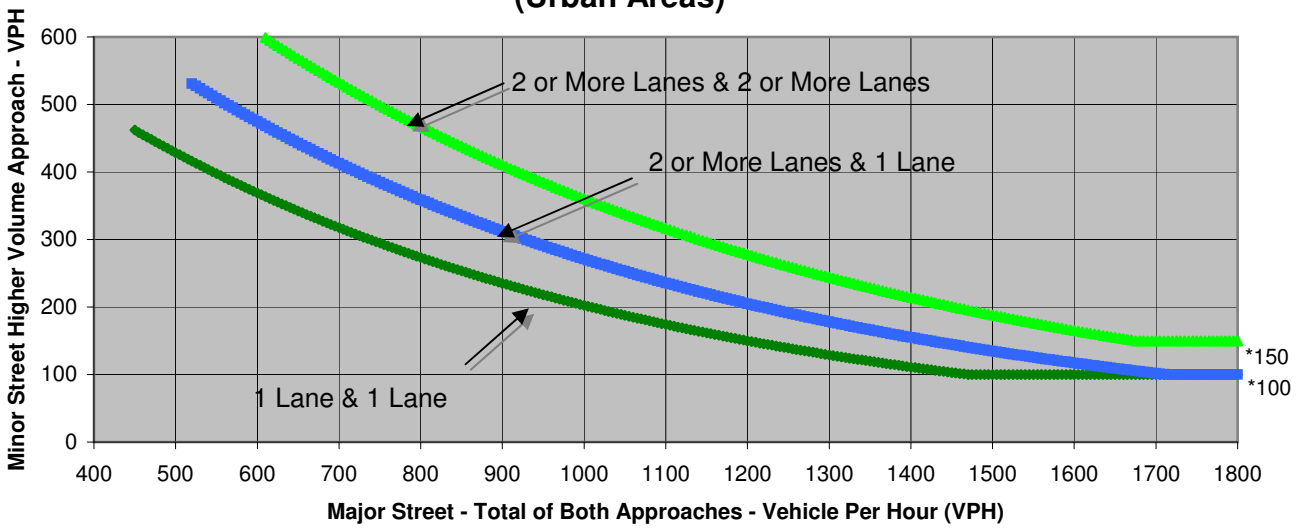
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	250	455	0
Through	752	715	0	0
Right	321	0	277	0
Total	1,073	965	732	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	SR 120 EB	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	2,038	732	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	SR 120 EB

Project	Union Crossing
Scenario	Existing + Project
Peak Hour	PM

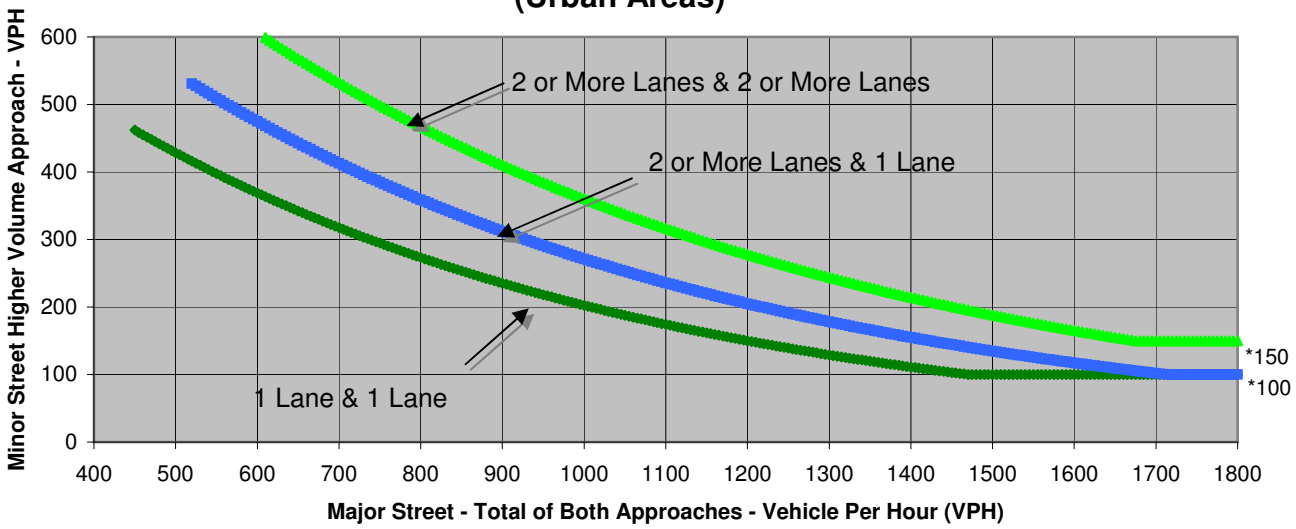
Turn Movement Volumes

	NB	SB	EB	WB
Left	235	0	0	274
Through	972	691	0	0
Right	0	150	0	335
Total	1,207	841	0	609

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	SR 120 EB	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	2,048	609	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Existing + Project
Peak Hour PM

Major Street Union Road
Minor Street Woodward Avenue

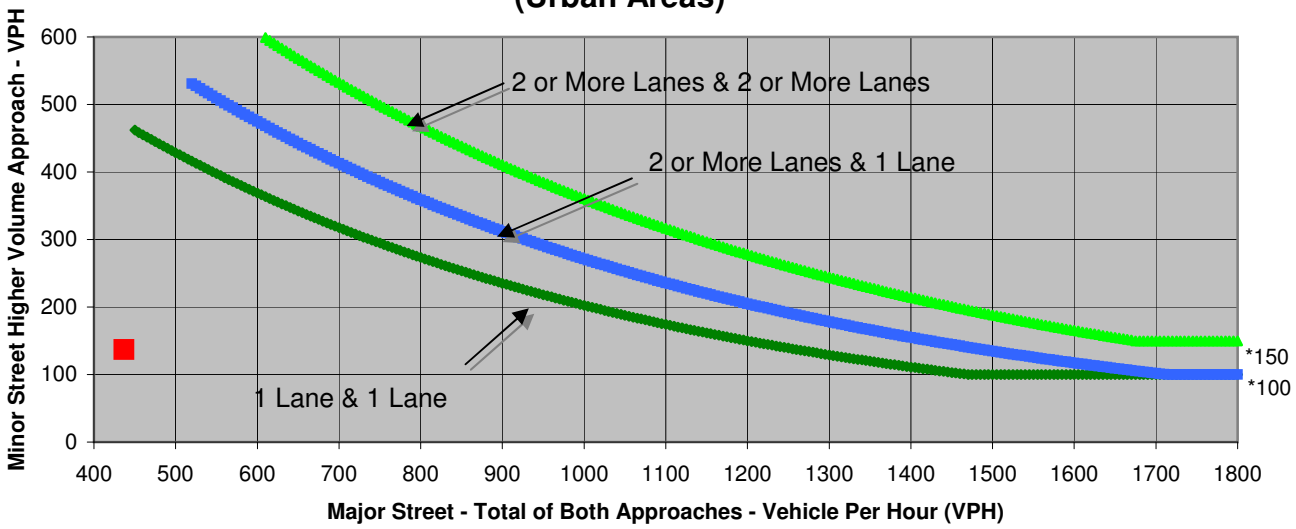
Turn Movement Volumes

	NB	SB	EB	WB
Left	9	144	26	8
Through	124	127	75	37
Right	12	21	3	92
Total	145	292	104	137

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

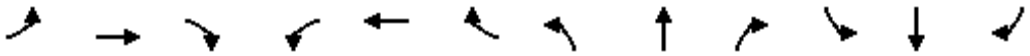


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	2	3	NO
Traffic Volume (VPH) *	437	137	

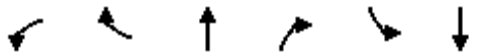
* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3389		1770	3248		1770	1827	1583	1770	1803	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3389		1770	3248		1770	1827	1583	1770	1803	
Volume (vph)	87	257	101	249	187	227	48	316	173	220	304	34
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	95	279	110	271	203	247	53	351	192	232	320	36
RTOR Reduction (vph)	0	39	0	0	182	0	0	0	114	0	3	0
Lane Group Flow (vph)	95	350	0	271	268	0	53	351	78	232	353	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	7.8	15.7		17.3	25.2		6.9	29.9	29.9	17.3	40.3	
Effective Green, g (s)	7.8	15.7		17.3	25.2		6.9	29.9	29.9	17.3	40.3	
Actuated g/C Ratio	0.08	0.16		0.18	0.26		0.07	0.31	0.31	0.18	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	144	553		318	851		127	568	492	318	755	
v/s Ratio Prot	0.05	c0.10		c0.15	0.08		0.03	c0.19		c0.13	0.20	
v/s Ratio Perm									0.05			
v/c Ratio	0.66	0.63		0.85	0.31		0.42	0.62	0.16	0.73	0.47	
Uniform Delay, d1	42.9	37.6		38.2	28.6		42.7	28.3	24.0	37.2	20.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.4	2.4		19.2	0.2		2.2	5.0	0.7	8.1	2.1	
Delay (s)	53.3	39.9		57.5	28.8		44.9	33.3	24.7	45.4	22.3	
Level of Service	D	D		E	C		D	C	C	D	C	
Approach Delay (s)		42.6			39.5			31.5			31.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	36.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	96.2	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	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	46	31	506	69	76	577
Peak Hour Factor	0.85	0.85	0.90	0.90	0.95	0.95
Hourly flow rate (vph)	54	36	562	77	80	607
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.81	0.81			0.81	
vC, conflicting volume	1370	605			641	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1454	514			559	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	49	92			90	
cM capacity (veh/h)	105	455			823	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	91	639	687
Volume Left	54	0	80
Volume Right	36	77	0
cSH	152	1700	823
Volume to Capacity	0.59	0.38	0.10
Queue Length 95th (ft)	78	0	8
Control Delay (s)	58.4	0.0	2.5
Lane LOS	F		A
Approach Delay (s)	58.4	0.0	2.5
Approach LOS	F		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1564	3433	1863	1562	1770	3471	1548	1770	1827	1548
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1564	3433	1863	1562	1770	3471	1548	1770	1827	1548
Volume (vph)	77	39	127	54	36	8	181	490	80	22	410	191
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	91	46	149	64	42	9	201	544	89	23	432	201
RTOR Reduction (vph)	0	0	105	0	0	7	0	0	46	0	0	129
Lane Group Flow (vph)	91	46	44	64	42	2	201	544	43	23	432	72
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		pm+ov	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.4	11.1	19.8	7.1	11.8	11.8	8.7	31.9	31.9	0.7	23.9	23.9
Effective Green, g (s)	6.4	11.1	19.8	7.1	11.8	11.8	8.7	31.9	31.9	0.7	23.9	23.9
Actuated g/C Ratio	0.10	0.17	0.30	0.11	0.18	0.18	0.13	0.48	0.48	0.01	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	329	310	557	365	329	276	231	1658	739	19	654	554
v/s Ratio Prot	c0.03	c0.02	0.01	0.02	0.02		c0.11	0.16		0.01	c0.24	
v/s Ratio Perm			0.02			0.00			0.03			0.05
v/c Ratio	0.28	0.15	0.08	0.18	0.13	0.01	0.87	0.33	0.06	1.21	0.66	0.13
Uniform Delay, d1	28.0	23.8	16.9	27.2	23.2	22.7	28.5	10.8	9.4	33.0	18.0	14.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.91	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.1	0.2	0.2	0.0	28.0	0.1	0.0	279.4	2.5	0.1
Delay (s)	28.5	24.0	17.0	27.4	23.3	22.7	56.6	10.8	8.6	312.5	20.5	14.6
Level of Service	C	C	B	C	C	C	E	B	A	F	C	B
Approach Delay (s)		21.8			25.6			21.6			28.9	
Approach LOS		C			C			C			C	

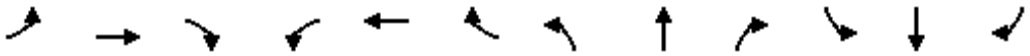
Intersection Summary			
HCM Average Control Delay	24.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	101	0	223	46	528	0	0	426	165
Peak Hour Factor	0.25	0.25	0.25	0.65	0.65	0.65	0.80	0.80	0.80	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	155	0	343	58	660	0	0	473	183
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											494	
pX, platoon unblocked	0.80	0.80	0.80	0.80	0.80		0.80					
vC, conflicting volume	1683	1340	565	1340	1432	660	657			660		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1857	1427	454	1427	1542	660	569			660		
tC, single (s)	7.1	6.5	6.2	*6.4	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	0	100	24	93			100		
cM capacity (veh/h)	10	100	483	113	85	453	800			928		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	498	58	660	657
Volume Left	155	58	0	0
Volume Right	343	0	0	183
cSH	234	800	1700	1700
Volume to Capacity	2.13	0.07	0.39	0.39
Queue Length 95th (ft)	950	6	0	0
Control Delay (s)	556.9	9.9	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	556.9	0.8		0.0
Approach LOS	F			

Intersection Summary				
Average Delay	148.5			
Intersection Capacity Utilization	65.1%	ICU Level of Service	C	
Analysis Period (min)	15			

* User Entered Value

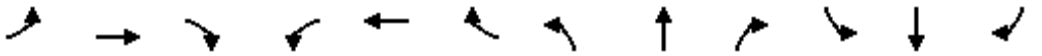


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	340	0	119	0	0	0	0	234	54	231	296	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.80	0.80	0.80
Hourly flow rate (vph)	378	0	132	0	0	0	0	260	60	289	370	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1238	1268	370	1370	1238	290	370			320		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1238	1268	370	1370	1238	290	370			320		
tC, single (s)	*6.5	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	100	80	100	100	100	100			76		
cM capacity (veh/h)	153	128	676	81	134	749	1189			1207		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	510	320	289	370
Volume Left	378	0	289	0
Volume Right	132	60	0	0
cSH	191	1700	1207	1700
Volume to Capacity	2.67	0.19	0.24	0.22
Queue Length 95th (ft)	1105	0	23	0
Control Delay (s)	803.4	0.0	8.9	0.0
Lane LOS	F		A	
Approach Delay (s)	803.4	0.0	3.9	
Approach LOS	F			

Intersection Summary			
Average Delay	277.0		
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

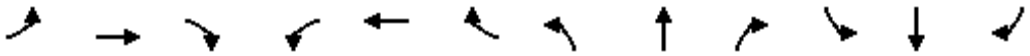
* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	87	7	13	11	3	61	10	140	13	92	272	51
Peak Hour Factor	0.85	0.85	0.85	0.75	0.75	0.75	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	102	8	15	15	4	81	12	175	16	115	340	64
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	813	786	340	782	834	175	404			191		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	813	786	340	782	834	175	404			191		
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 %	59	97	98	95	99	91	99			92		
cM capacity (veh/h)	247	294	702	277	276	868	1155			1382		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	126	15	85	12	175	16	115	340	64
Volume Left	102	15	0	12	0	0	115	0	0
Volume Right	15	0	81	0	0	16	0	0	64
cSH	286	277	911	1155	1700	1700	1382	1700	1700
Volume to Capacity	0.44	0.05	0.09	0.01	0.10	0.01	0.08	0.20	0.04
Queue Length 95th (ft)	53	4	8	1	0	0	7	0	0
Control Delay (s)	27.8	18.7	10.0	8.2	0.0	0.0	7.8	0.0	0.0
Lane LOS	D	C	A	A			A		
Approach Delay (s)	27.8	11.3		0.5			1.7		
Approach LOS	D	B							

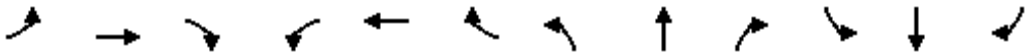
Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	39.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	36	29	4	3	29	45	7	82	5	55	199	43
Peak Hour Factor	0.60	0.60	0.60	0.65	0.65	0.65	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	60	48	7	5	45	69	8	96	6	65	234	51

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	115	118	111	349
Volume Left (vph)	60	5	8	65
Volume Right (vph)	7	69	6	51
Hadj (s)	0.10	-0.31	0.02	-0.02
Departure Headway (s)	5.3	4.9	5.0	4.6
Degree Utilization, x	0.17	0.16	0.15	0.45
Capacity (veh/h)	615	661	670	740
Control Delay (s)	9.4	8.8	8.9	11.4
Approach Delay (s)	9.4	8.8	8.9	11.4
Approach LOS	A	A	A	B

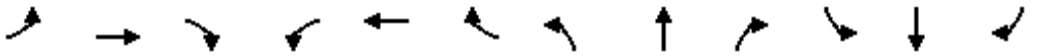
Intersection Summary			
Delay	10.2		
HCM Level of Service	B		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3407		1770	3294		1770	3377	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3407		1770	3294		1770	3377	
Volume (vph)	287	419	277	108	326	108	242	550	99	116	505	222
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	312	455	301	117	354	117	285	647	116	129	561	247
RTOR Reduction (vph)	0	0	217	0	42	0	0	18	0	0	62	0
Lane Group Flow (vph)	312	455	84	117	429	0	285	745	0	129	746	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.0	21.8	21.8	6.0	17.8		13.0	26.2		7.8	21.0	
Effective Green, g (s)	10.0	21.8	21.8	6.0	17.8		13.0	26.2		7.8	21.0	
Actuated g/C Ratio	0.13	0.28	0.28	0.08	0.23		0.17	0.34		0.10	0.27	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	228	522	444	137	779		296	1109		177	912	
v/s Ratio Prot	c0.18	c0.24		0.07	0.13		c0.16	0.23		0.07	c0.22	
v/s Ratio Perm			0.05									
v/c Ratio	1.37	0.87	0.19	0.85	0.55		0.96	0.67		0.73	0.82	
Uniform Delay, d1	33.9	26.7	21.3	35.5	26.5		32.2	22.1		34.0	26.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	191.2	14.8	0.2	37.3	0.8		42.0	3.3		13.9	8.1	
Delay (s)	225.1	41.4	21.5	72.7	27.3		74.2	25.4		47.9	34.7	
Level of Service	F	D	C	E	C		E	C		D	C	
Approach Delay (s)		89.5			36.4			38.6			36.5	
Approach LOS		F			D			D			D	

Intersection Summary			
HCM Average Control Delay	52.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

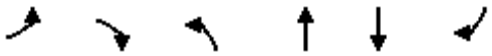
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.91		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1735		1770	1704		1770	3287		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1735		1770	1704		1770	3287		1770	1863	1583
Volume (vph)	45	95	80	95	95	125	115	795	169	155	565	70
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	53	112	94	112	112	147	135	935	199	172	628	78
RTOR Reduction (vph)	0	49	0	0	77	0	0	24	0	0	0	71
Lane Group Flow (vph)	53	157	0	112	182	0	135	1110	0	172	628	7
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	4.5	11.0		5.3	11.8		6.1	19.6		8.1	21.6	4.5
Effective Green, g (s)	4.5	11.0		5.3	11.8		6.1	19.6		8.1	21.6	4.5
Actuated g/C Ratio	0.08	0.18		0.09	0.20		0.10	0.33		0.13	0.36	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	133	318		156	335		180	1074		239	671	119
v/s Ratio Prot	0.03	0.09		c0.06	c0.11		0.08	c0.34		c0.10	0.34	0.00
v/s Ratio Perm												
v/c Ratio	0.40	0.49		0.72	0.54		0.75	1.03		0.72	0.94	0.06
Uniform Delay, d1	26.5	22.0		26.6	21.7		26.2	20.2		24.9	18.5	25.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.0	1.2		14.6	1.8		16.0	36.6		9.9	22.2	0.2
Delay (s)	28.4	23.2		41.2	23.5		42.2	56.8		34.8	40.7	26.0
Level of Service	C	C		D	C		D	E		C	D	C
Approach Delay (s)		24.3			28.8			55.2			38.2	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM Average Control Delay	43.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	35	92	115	1155	749	35
Peak Hour Factor	0.92	0.92	0.85	0.85	0.90	0.90
Hourly flow rate (vph)	38	100	135	1359	832	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2481	852	871			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2481	852	871			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	72	83			
cM capacity (veh/h)	27	360	774			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	138	1494	871
Volume Left	38	135	0
Volume Right	100	0	39
cSH	82	774	1700
Volume to Capacity	1.69	0.17	0.51
Queue Length 95th (ft)	289	16	0
Control Delay (s)	445.3	9.4	0.0
Lane LOS	F	A	
Approach Delay (s)	445.3	9.4	0.0
Approach LOS	F		

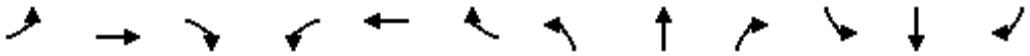
Intersection Summary			
Average Delay	30.2		
Intersection Capacity Utilization	126.3%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	274	0	335	235	935	0	0	691	150
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	304	0	372	276	1100	0	0	768	167
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2876	2504	851	2504	2587	1100	934			1100		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2876	2504	851	2504	2587	1100	934			1100		
tC, single (s)	7.1	6.5	6.2	*6.5	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	100	0	100	0	62			100		
cM capacity (veh/h)	0	18	360	21	16	258	733			635		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	677	276	1100	934
Volume Left	304	276	0	0
Volume Right	372	0	0	167
cSH	42	733	1700	1700
Volume to Capacity	15.95	0.38	0.65	0.55
Queue Length 95th (ft)	Err	44	0	0
Control Delay (s)	Err	12.9	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	Err	2.6		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	2265.9		
Intersection Capacity Utilization	123.2%	ICU Level of Service	H
Analysis Period (min)	15		

* User Entered Value

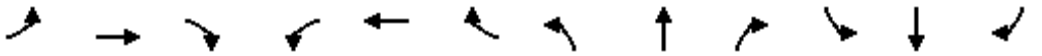


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	455	0	277	0	0	0	0	715	321	250	715	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85
Hourly flow rate (vph)	506	0	308	0	0	0	0	794	357	294	841	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								859				
pX, platoon unblocked	0.94	0.94		0.94	0.94	0.94				0.94		
vC, conflicting volume	2402	2581	841	2710	2402	973	841			1151		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2494	2684	841	2822	2494	971	841			1161		
tC, single (s)	*6.4	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	13	100	100	100	100			48		
cM capacity (veh/h)	18	10	356	1	13	288	794			565		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	813	1151	294	841
Volume Left	506	0	294	0
Volume Right	308	357	0	0
cSH	28	1700	565	1700
Volume to Capacity	29.06	0.68	0.52	0.49
Queue Length 95th (ft)	Err	0	75	0
Control Delay (s)	Err	0.0	18.1	0.0
Lane LOS	F		C	
Approach Delay (s)	Err	0.0	4.7	
Approach LOS	F			

Intersection Summary			
Average Delay	2625.3		
Intersection Capacity Utilization	123.2%	ICU Level of Service	H
Analysis Period (min)	15		

* User Entered Value



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Volume (vph)	769	18	63	7	13	44	81	225	5	31	472	174
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	836	20	68	8	14	48	88	245	5	34	513	189
RTOR Reduction (vph)	0	0	45	0	0	44	0	0	3	0	0	107
Lane Group Flow (vph)	836	20	23	8	14	4	88	245	2	34	513	82
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	30.2	38.0	38.0	1.3	9.1	9.1	7.0	50.5	50.5	4.2	47.7	47.7
Effective Green, g (s)	30.2	38.0	38.0	1.3	9.1	9.1	7.0	50.5	50.5	4.2	47.7	47.7
Actuated g/C Ratio	0.27	0.35	0.35	0.01	0.08	0.08	0.06	0.46	0.46	0.04	0.43	0.43
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	943	1223	547	41	293	231	218	1625	1279	131	1535	686
v/s Ratio Prot	c0.24	0.01		0.00	0.00		c0.03	c0.07		0.01	c0.14	
v/s Ratio Perm			c0.01			0.00			0.00			0.05
v/c Ratio	0.89	0.02	0.04	0.20	0.05	0.02	0.40	0.15	0.00	0.26	0.33	0.12
Uniform Delay, d1	38.3	23.7	23.9	53.8	46.5	46.3	49.5	17.3	16.1	51.4	20.6	18.6
Progression Factor	0.94	0.69	0.55	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.90
Incremental Delay, d2	8.3	0.0	0.0	2.3	0.1	0.0	1.2	0.2	0.0	1.1	0.6	0.4
Delay (s)	44.1	16.4	13.1	56.2	46.5	46.4	50.7	17.5	16.1	52.4	21.1	17.2
Level of Service	D	B	B	E	D	D	D	B	B	D	C	B
Approach Delay (s)		41.3			47.5			26.1			21.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	32.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

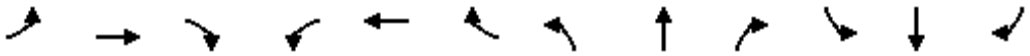
Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.

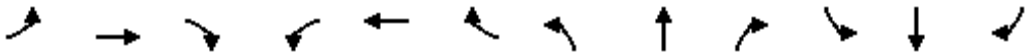
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1490
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1490
Volume (vph)	0	0	0	37	0	249	66	676	0	0	472	443
Peak-hour factor, PHF	0.25	0.25	0.25	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	41	0	277	73	751	0	0	524	492
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	144
Lane Group Flow (vph)	0	0	0	0	41	277	73	751	0	0	524	348
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					3.7	71.8	6.8	60.1			49.3	49.3
Effective Green, g (s)					3.7	71.8	6.8	60.1			49.3	49.3
Actuated g/C Ratio					0.05	1.00	0.09	0.84			0.69	0.69
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					89	1492	164	1500			1230	1023
v/s Ratio Prot					c0.02		0.04	c0.42			0.29	
v/s Ratio Perm						0.19						0.23
v/c Ratio					0.46	0.19	0.45	0.50			0.43	0.34
Uniform Delay, d1					33.1	0.0	30.7	1.6			5.0	4.6
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					3.7	0.3	1.9	0.3			0.2	0.2
Delay (s)					36.8	0.3	32.6	1.9			5.2	4.8
Level of Service					D	A	C	A			A	A
Approach Delay (s)		0.0			5.0			4.6			5.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	4.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	71.8	Sum of lost time (s)	8.0
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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1518					1800		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1518					1800		1703	1827	
Volume (vph)	480	0	183	0	0	0	0	262	27	228	281	0
Peak-hour factor, PHF	0.80	0.80	0.80	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Adj. Flow (vph)	600	0	229	0	0	0	0	276	28	268	331	0
RTOR Reduction (vph)	0	0	105	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	600	124	0	0	0	0	300	0	268	331	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		40.8	40.8					20.2		18.9	43.1	
Effective Green, g (s)		40.8	40.8					20.2		18.9	43.1	
Actuated g/C Ratio		0.44	0.44					0.22		0.21	0.47	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		756	674					396		350	857	
v/s Ratio Prot		c0.35						c0.17		c0.16	0.18	
v/s Ratio Perm			0.08									
v/c Ratio		0.79	0.18					0.76		0.77	0.39	
Uniform Delay, d1		21.9	15.5					33.6		34.4	15.8	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		5.7	0.1					8.1		9.6	0.3	
Delay (s)		27.7	15.6					41.6		44.0	16.1	
Level of Service		C	B					D		D	B	
Approach Delay (s)		24.3			0.0			41.6			28.6	
Approach LOS		C			A			D			C	

Intersection Summary			
HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	91.9	Sum of lost time (s)	12.0
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			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	0	0	289	0	0	464	0
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	0	0	0	0	304	0	0	546	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	850	850	546	850	850	304	546			304		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	832	832	492	832	832	304	492			304		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	258	272	515	258	272	736	957			1257		

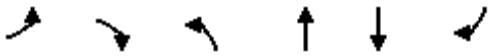
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	304	546
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	957	1257
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	0.0	0.0	0.0	0.0
Approach LOS	A	A		

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	27.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

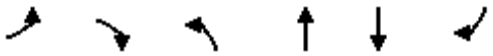
Channelized right turn lanes are not counted.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	0	1037	677	316
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1127	736	343
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				370		
pX, platoon unblocked	0.97					
vC, conflicting volume	1471	540	1079			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1456	540	1079			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	117	486	642			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	564	564	491	589
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	343
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.33	0.33	0.29	0.35
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

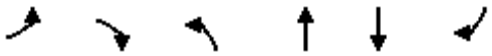
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	34	0	317	368	174
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	37	0	345	400	189
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					310	
pX, platoon unblocked	0.91	0.91	0.91			
vC, conflicting volume	667	295	589			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	530	120	445			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	100			
cM capacity (veh/h)	434	825	1009			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	37	172	172	267	322
Volume Left	0	0	0	0	0
Volume Right	37	0	0	0	189
cSH	825	1700	1700	1700	1700
Volume to Capacity	0.04	0.10	0.10	0.16	0.19
Queue Length 95th (ft)	4	0	0	0	0
Control Delay (s)	9.6	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.6	0.0		0.0	
Approach LOS	A				

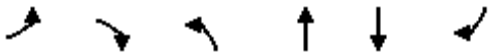
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	98	11	31	219	333	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	107	12	34	238	362	76
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					530	
pX, platoon unblocked	0.96	0.96	0.96			
vC, conflicting volume	586	219	438			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	531	150	377			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	76	99	97			
cM capacity (veh/h)	446	837	1134			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	107	12	34	119	119	241	197
Volume Left	107	0	34	0	0	0	0
Volume Right	0	12	0	0	0	0	76
cSH	446	837	1134	1700	1700	1700	1700
Volume to Capacity	0.24	0.01	0.03	0.07	0.07	0.14	0.12
Queue Length 95th (ft)	23	1	2	0	0	0	0
Control Delay (s)	15.6	9.4	8.3	0.0	0.0	0.0	0.0
Lane LOS	C	A	A				
Approach Delay (s)	15.0		1.0			0.0	
Approach LOS	B						

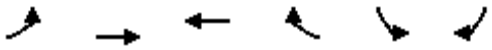
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	11	0	250	295	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	12	0	272	321	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					720	
pX, platoon unblocked						
vC, conflicting volume	484	188	375			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	484	188	375			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	512	823	1180			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	136	136	214	161
Volume Left	0	0	0	0	0
Volume Right	12	0	0	0	54
cSH	823	1700	1700	1700	1700
Volume to Capacity	0.01	0.08	0.08	0.13	0.09
Queue Length 95th (ft)	1	0	0	0	0
Control Delay (s)	9.4	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.4	0.0		0.0	
Approach LOS	A				

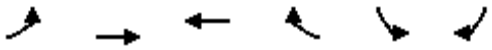
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	110	66	16	0	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	120	72	17	0	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	89				140	45
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	89				140	45
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1504				838	1016

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	60	60	48	41	3
Volume Left	0	0	0	0	0
Volume Right	0	0	0	17	3
cSH	1700	1700	1700	1700	1016
Volume to Capacity	0.04	0.04	0.03	0.02	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	8.6
Lane LOS					A
Approach Delay (s)	0.0		0.0		8.6
Approach LOS					A

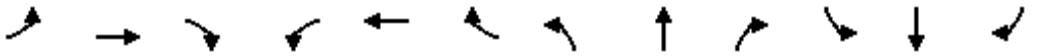
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	0	23	52	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	25	57	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			451			
pX, platoon unblocked						
vC, conflicting volume	25				12	12
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	25				12	12
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	100
cM capacity (veh/h)	1588				1005	1065

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	0	0	0	25	57	0
Volume Left	0	0	0	0	57	0
Volume Right	0	0	0	25	0	0
cSH	1700	1700	1700	1700	1005	1700
Volume to Capacity	0.00	0.00	0.00	0.01	0.06	0.00
Queue Length 95th (ft)	0	0	0	0	4	0
Control Delay (s)	0.0	0.0	0.0	0.0	8.8	0.0
Lane LOS					A	A
Approach Delay (s)	0.0		0.0		8.8	
Approach LOS					A	

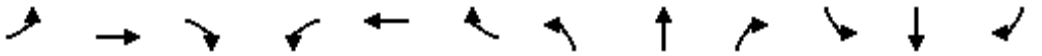
Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	52	0	18	23	32	0	0	15	110	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)	0	57	0	20	25	35	0	0	16	120	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	60			57			108	155	28	126	138	30
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	60			57			108	155	28	126	138	30
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	85	100	100
cM capacity (veh/h)	1542			1546			851	726	1040	814	742	1038

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	28	28	20	17	43	16	120
Volume Left	0	0	20	0	0	0	120
Volume Right	0	0	0	0	35	16	0
cSH	1700	1700	1546	1700	1700	1040	814
Volume to Capacity	0.02	0.02	0.01	0.01	0.03	0.02	0.15
Queue Length 95th (ft)	0	0	1	0	0	1	13
Control Delay (s)	0.0	0.0	7.4	0.0	0.0	8.5	10.2
Lane LOS			A			A	B
Approach Delay (s)	0.0		1.8			8.5	10.2
Approach LOS						A	B

Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95		0.97	0.95			1.00	1.00		1.00	
Frt		1.00		1.00	0.92			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.96	
Satd. Flow (prot)		3539		3433	3240			1863	1583		1794	
Flt Permitted		1.00		0.95	1.00			1.00	1.00		0.96	
Satd. Flow (perm)		3539		3433	3240			1863	1583		1794	
Volume (vph)	0	176	0	98	74	95	0	107	326	346	109	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	191	0	107	80	103	0	116	354	376	118	0
RTOR Reduction (vph)	0	0	0	0	75	0	0	0	277	0	0	0
Lane Group Flow (vph)	0	191	0	107	108	0	0	116	77	0	494	0
Turn Type	Prot			Prot			Split		Perm	Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases									2			6
Actuated Green, G (s)		11.5		14.5	30.0			24.0	24.0		44.0	
Effective Green, g (s)		11.5		14.5	30.0			24.0	24.0		44.0	
Actuated g/C Ratio		0.10		0.13	0.27			0.22	0.22		0.40	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		370		453	884			406	345		718	
v/s Ratio Prot		c0.05		c0.03	0.03			c0.06			c0.28	
v/s Ratio Perm									0.05			
v/c Ratio		0.52		0.24	0.12			0.29	0.22		0.69	
Uniform Delay, d1		46.6		42.8	30.1			35.9	35.3		27.3	
Progression Factor		1.00		0.98	1.08			1.00	1.00		1.00	
Incremental Delay, d2		1.2		1.2	0.1			1.8	1.5		5.3	
Delay (s)		47.8		43.3	32.6			37.6	36.8		32.6	
Level of Service		D		D	C			D	D		C	
Approach Delay (s)		47.8			36.5			37.0			32.6	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec):	100	Critical Vol./Cap.(X):	0.252
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	9.8
Optimal Cycle:	0	Level Of Service:	A

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	2	114	12	102	127	9	12	75	3	8	37	49
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	2	114	12	102	127	9	12	75	3	8	37	49
Added Vol:	0	13	0	42	14	14	20	0	0	0	0	39
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	2	127	12	144	141	23	32	75	3	8	37	88
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	2	127	12	144	141	23	32	75	3	8	37	88
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	2	127	12	144	141	23	32	75	3	8	37	88
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	2	127	12	144	141	23	32	75	3	8	37	88
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	531	577	645	571	619	701	511	552	616	514	554	623
Capacity Analysis Module:												
Vol/Sat:	0.00	0.22	0.02	0.25	0.23	0.03	0.06	0.14	0.00	0.02	0.07	0.14
Crit Moves:		****		****				****				****
Delay/Veh:	9.1	10.2	8.0	10.7	9.8	7.7	9.7	9.7	8.1	9.4	9.2	8.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.1	10.2	8.0	10.7	9.8	7.7	9.7	9.7	8.1	9.4	9.2	8.9
LOS by Move:	A	B	A	B	A	A	A	A	A	A	A	A
ApproachDel:		10.0			10.1			9.7			9.0	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		10.0			10.1			9.7			9.0	
LOS by Appr:		A			B			A			A	
AllWayAvgQ:	0.0	0.2	0.0	0.3	0.3	0.0	0.1	0.1	0.0	0.0	0.1	0.1

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #14

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.38			0.51			0.36			0.36		
P[C2]:	0.28			0.15			0.09			0.08		
P[C3]:	0.18			0.24			0.37			0.38		
P[C4]:	0.15			0.10			0.17			0.16		
P[C5]:	0.02			0.01			0.02			0.02		
Padj[C1]:	0.012			0.009			0.014			0.014		
Padj[C2]:	0.002			0.003			0.007			0.007		
Padj[C3]:	-0.003			-0.006			-0.009			-0.009		
Padj[C4]:	-0.009			-0.006			-0.010			-0.010		
Padj[C5]:	-0.002			-0.001			-0.002			-0.002		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	2	12		144	23		32	3		8	88	
Capacity:	531	645		571	701		511	616		514	623	
DegOfUtil:	0.00	0.02		0.24	0.03		0.06	0.00		0.01	0.13	
DepHeadway:	6.43	5.23		6.09	4.89		6.60	5.40		6.58	5.38	
ServiceTime:	4.1	2.9		3.8	2.6		4.3	3.1		4.3	3.1	
Delay:	9.1	8.0		10.7	7.7		9.7	8.1		9.4	8.9	
Queue:	0.0	0.0		0.3	0.0		0.1	0.0		0.0	0.1	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	127			141			75			37		
Capacity:	577			619			552			554		
DegOfUtil:	0.21			0.22			0.13			0.06		
DepHeadway:	5.93			5.59			6.10			6.08		
ServiceTime:	3.6			3.3			3.8			3.8		
Delay:	10.2			9.8			9.7			9.2		
Queue:	0.2			0.3			0.1			0.1		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	10.0			10.1			9.7			9.0		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	10.0			10.1			9.7			9.0		
LOS by Appr:	A			B			A			A		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	9.8
OverallLOS:	A

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	2	127	12	144	141	23	32	75	3	8	37	88

Major Street Volume: 449
Minor Approach Volume: 133
Minor Approach Volume Threshold: 718

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec): 100 | Critical Vol./Cap.(X): 0.419
Loss Time (sec): 0 (Y+R=4.0 sec) | Average Delay (sec/veh): 12.4
Optimal Cycle: 0 | Level Of Service: B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	23	160	16	209	223	32	22	117	49	20	66	107
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	23	160	16	209	223	32	22	117	49	20	66	107
Added Vol:	0	0	0	0	0	0	0	21	0	0	20	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	23	160	16	209	223	32	22	138	49	20	86	107
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	23	160	16	209	223	32	22	138	49	20	86	107
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	23	160	16	209	223	32	22	138	49	20	86	107
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	23	160	16	209	223	32	22	138	49	20	86	107
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	448	483	526	499	536	590	442	475	519	441	472	520
Capacity Analysis Module:												
Vol/Sat:	0.05	0.33	0.03	0.42	0.42	0.05	0.05	0.29	0.09	0.05	0.18	0.21
Crit Moves:		****		****				****				****
Delay/Veh:	10.6	12.9	9.2	14.4	13.5	8.8	10.7	12.5	9.7	10.7	11.3	10.6
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.6	12.9	9.2	14.4	13.5	8.8	10.7	12.5	9.7	10.7	11.3	10.6
LOS by Move:	B	B	A	B	B	A	B	B	A	B	B	B
ApproachDel:	12.3			13.5			11.6			10.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	12.3			13.5			11.6			10.9		
LOS by Appr:	B			B			B			B		
AllWayAvgQ:	0.0	0.4	0.0	0.6	0.6	0.1	0.0	0.3	0.1	0.0	0.2	0.2

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #18

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.14			0.26			0.14			0.14		
P[C2]:	0.27			0.15			0.08			0.08		
P[C3]:	0.16			0.29			0.35			0.34		
P[C4]:	0.35			0.25			0.35			0.35		
P[C5]:	0.09			0.05			0.09			0.09		
Padj[C1]:	0.020			0.017			0.022			0.022		
Padj[C2]:	0.008			0.008			0.012			0.012		
Padj[C3]:	0.001			-0.005			-0.005			-0.005		
Padj[C4]:	-0.020			-0.015			-0.020			-0.020		
Padj[C5]:	-0.009			-0.005			-0.009			-0.009		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	23	16		209	32		22	49		20	107	
Capacity:	448	526		499	590		442	519		441	520	
DegOfUtil:	0.05	0.03		0.41	0.05		0.05	0.09		0.04	0.19	
DepHeadway:	7.53	6.33		6.98	5.78		7.62	6.42		7.63	6.43	
ServiceTime:	5.2	4.0		4.7	3.5		5.3	4.1		5.3	4.1	
Delay:	10.6	9.2		14.4	8.8		10.7	9.7		10.7	10.6	
Queue:	0.0	0.0		0.6	0.1		0.0	0.1		0.0	0.2	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	160			223			138			86		
Capacity:	483			536			475			472		
DegOfUtil:	0.31			0.40			0.27			0.17		
DepHeadway:	7.03			6.48			7.12			7.13		
ServiceTime:	4.7			4.2			4.8			4.8		
Delay:	12.9			13.5			12.5			11.3		
Queue:	0.4			0.6			0.3			0.2		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	12.3			13.5			11.6			10.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	12.3			13.5			11.6			10.9		
LOS by Appr:	B			B			B			B		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	12.4
OverallLOS:	B

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	23	160	16	209	223	32	22	138	49	20	86	107

Major Street Volume: 663
Minor Approach Volume: 213
Minor Approach Volume Threshold: 551

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Cumulative No Project AM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4754	veh/h
Peak-hour factor, PHF	0.97	
Peak 15-min volume, v15	1225	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1748	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1748	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.3	mi/h
Number of lanes, N	3	
Density, D	27.2	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Aiport
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3517	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	956	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1338	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1338	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	20.6	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3867	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1051	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1471	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1471	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	22.6	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3792	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1030	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1443	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1443	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	22.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3447	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	937	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1311	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1311	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	20.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5025	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1365	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1912	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1912	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.7	mi/h
Number of lanes, N	3	
Density, D	30.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5940	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1614	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2260	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2260	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.3	mi/h
Number of lanes, N	3	
Density, D	40.9	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6840	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1859	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2602	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2602	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7055	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1917	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2684	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2684	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6894	veh/h
Peak-hour factor, PHF	0.93	
Peak 15-min volume, v15	1853	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2595	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2595	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7067	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1963	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2801	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2801	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to Lathrop
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4276	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1188	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2542	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2542	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To:
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4109	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1141	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2443	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2443	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5735	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1593	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2273	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2273	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	54.9	mi/h
Number of lanes, N	3	
Density, D	41.4	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5643	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1568	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2236	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2236	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	56.0	mi/h
Number of lanes, N	3	
Density, D	39.9	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3517	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	740	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3517	740		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	956	231		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4014	948		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.616 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2837$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4014	7050	No
$v_{FO} = v - v_R$	3066	7050	No
v_R	948	2000	No
$v_{3 \text{ or } av34}$	1177 pc/h	(Equation 25-15 or 25-16)	

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$? No

If yes, v_{12A} = (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2837	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 27.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.513$

Space mean speed in ramp influence area, $S_R = 53.2$ mph

Space mean speed in outer lanes, $S_0 = 70.6$ mph

Space mean speed for all vehicles, $S = 57.3$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2777	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1090	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2777	1090		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	755	296		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3169	1214		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 1874 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v FO	4383	7050	No

v v 1295 pc/h (Equation 25-4 or 25-5)
3 or av34

Is v v > 2700 pc/h? No
3 or av34

Is v v > 1.5 v /2 No
3 or av34 12

If yes, v = (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v 12	1874	4400	No !

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 25.9 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence C

_____Speed Estimation_____

Intermediate speed variable, M = 0.372
S

Space mean speed in ramp influence area, S = 56.5 mph
R

Space mean speed in outer lanes, S = 62.1 mph
0

Space mean speed for all vehicles, S = 58.0 mph

_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3867	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	575	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3867	575		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	1051	180		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4413	737		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.616 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3001$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4413	7050	No
$v_{FO} = v - v_R$	3676	7050	No
v_R	737	2000	No

$v_{3 \text{ or } av34} = v_R$ 1412 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3001	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 28.7$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.494$

Space mean speed in ramp influence area, $S_R = 53.6$ mph

Space mean speed in outer lanes, $S_0 = 69.7$ mph

Space mean speed for all vehicles, $S = 57.9$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3292	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	500	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3292	500		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	895	136		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3757	557		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 2222$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4314	7050	No

$v_{3 \text{ or } av34} = v_{FM}$ 1535 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2222	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_{R12} + 0.0078 v_{RA} - 0.00627 L_A = 23.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.349$

Space mean speed in ramp influence area, $S_R = 57.0$ mph

Space mean speed in outer lanes, $S_0 = 61.3$ mph

Space mean speed for all vehicles, $S = 58.4$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5940	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	555	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5940	555		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1614	146		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6779	599		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.563 Using Equation 5

FD
$v_{12} = v_R + (v_F - v_R) P_{FD} = 4078$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6779	7050	No
$v_{FO} = v_F - v_R$	6180	7050	No
v_R	599	2000	No

$v_{3 \text{ or } av34} = v_R$ 2701 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 4079$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4079	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 38.0$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, $D_S = 0.482$

Space mean speed in ramp influence area, $S_R = 53.9$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 57.7$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5385	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1455	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5385	1455		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1463	395		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6146	1621		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 3635$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7767	7050	Yes

$v_{3 \text{ or } av34} = v_{av34}$ 2511 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3635	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_{R12} + 0.0078 v_{RA} - 0.00627 L_A = 42.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 1.034$

Space mean speed in ramp influence area, $S_R = 41.2$ mph

Space mean speed in outer lanes, $S_0 = 57.2$ mph

Space mean speed for all vehicles, $S = 45.3$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6840	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1615	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6840	1615		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1859	425		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7807	1742		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.485 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 4682$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7807	7050	Yes
$v_{FO} = v - v_R$	6065	7050	No
v_R	1742	2000	No
$v_{3 \text{ or } av34}$	3125 pc/h	(Equation 25-15 or 25-16)	

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 5107$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5107	4600	No !

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 46.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $D_S = 0.585$

Space mean speed in ramp influence area, $S_R = 51.6$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 55.4$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5225	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1830	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5225	1830		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1420	497		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	5963	2039		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 3527 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	8002	7050	Yes
FO			

v v 2436 pc/h (Equation 25-4 or 25-5)
3 or av34
Is v v > 2700 pc/h? No
3 or av34
Is v v > 1.5 v /2 No
3 or av34 12
If yes, v = (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	3527	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 44.8 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence F

_____Speed Estimation_____

Intermediate speed variable, M = 1.305
S
Space mean speed in ramp influence area, S = 35.0 mph
R
Space mean speed in outer lanes, S = 57.7 mph
0
Space mean speed for all vehicles, S = 39.7 mph
_____

Leisch Method for Weaving Analysis

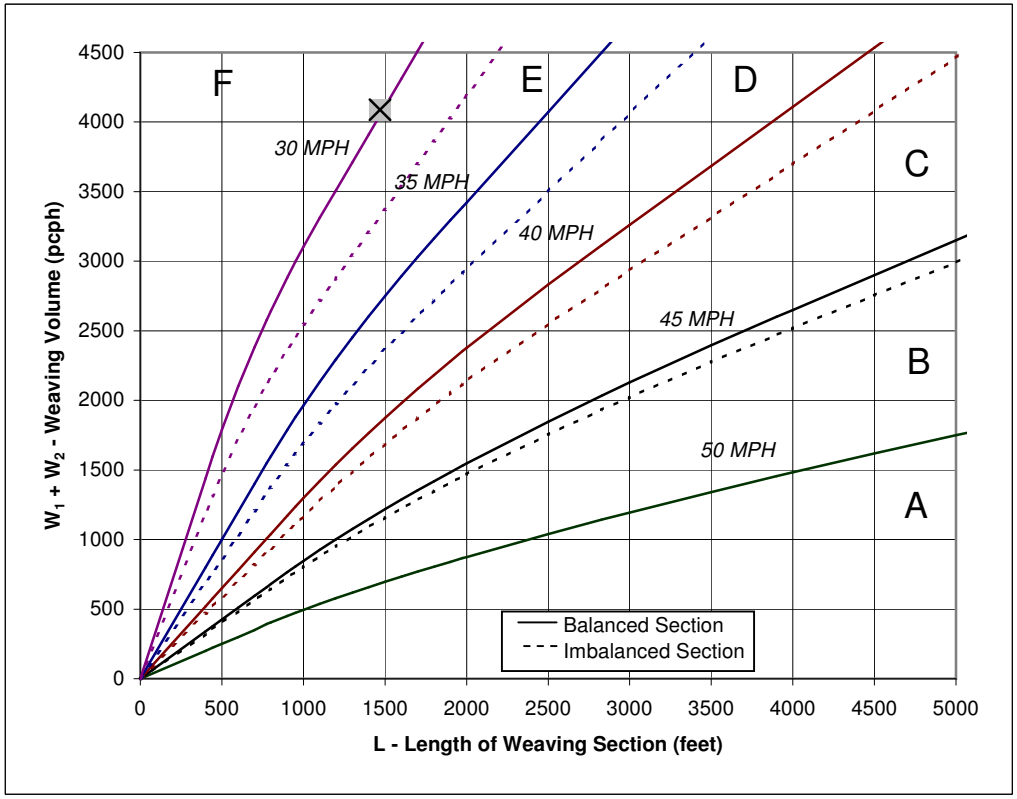
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

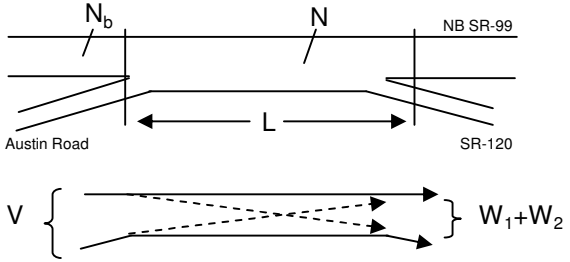
Project Information

Project	Union Crossing
Scenario	Cumulative NO PROJECT - AM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120

	Total Weaving Section (V)	On-ramp to Mainline (W_1)	Mainline to Off-ramp (W_2)
Volume (vph)*	4,351	96	1,892
Truck Percentage	14%	6%	10%
PCE for Trucks	1.5	1.5	1.5
Volume (pcph)	6,321	478	3,610



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **27.0**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,819**
6. Level of Service (LOS) **E**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

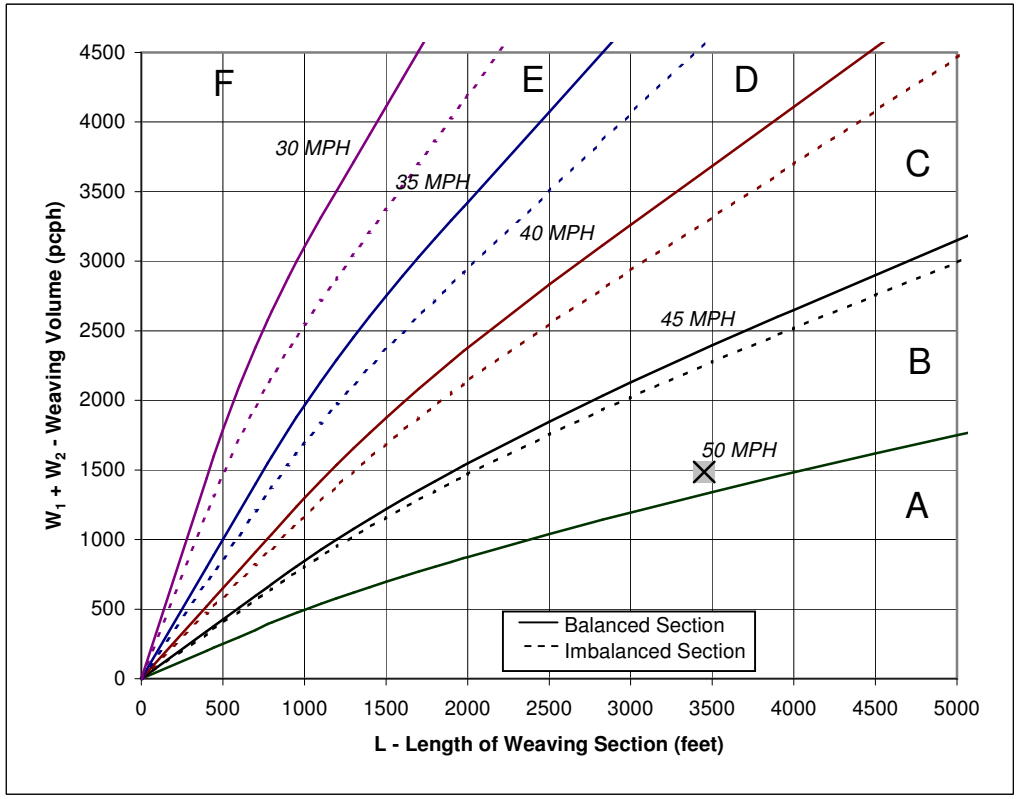
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

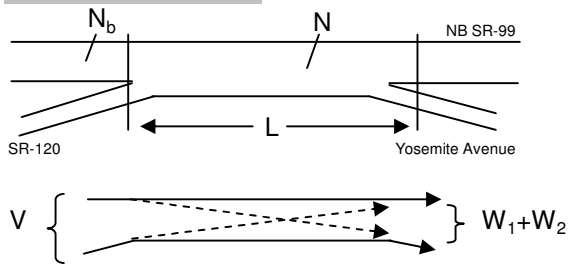
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,009	Volume (vph)*	275	Volume (vph)*	357
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,701	Volume (pcph)	835	Volume (pcph)	650

Project Information

Project	Union Crossing
Scenario	Cumulative NO PROJECT - AM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **49.2**
4. Weaving Intensity Factor (k) **1.32**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,303**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

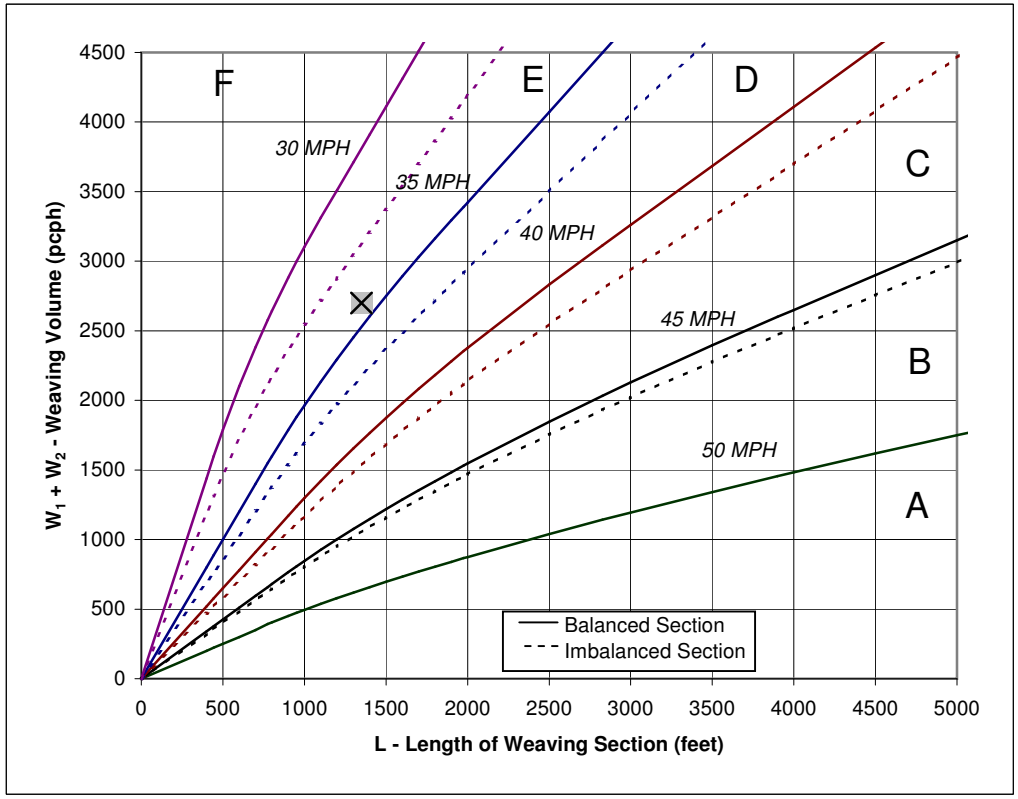
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

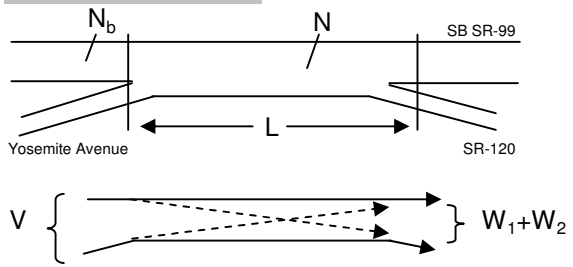
Project Information

Project	Union Crossing
Scenario	Cumulative NO PROJECT - AM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,235	Volume (vph)*	796	Volume (vph)*	550
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	4,692	Volume (pcph)	1,284	Volume (pcph)	1,415



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **28.0**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,420**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Atherton Drive

Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	AM

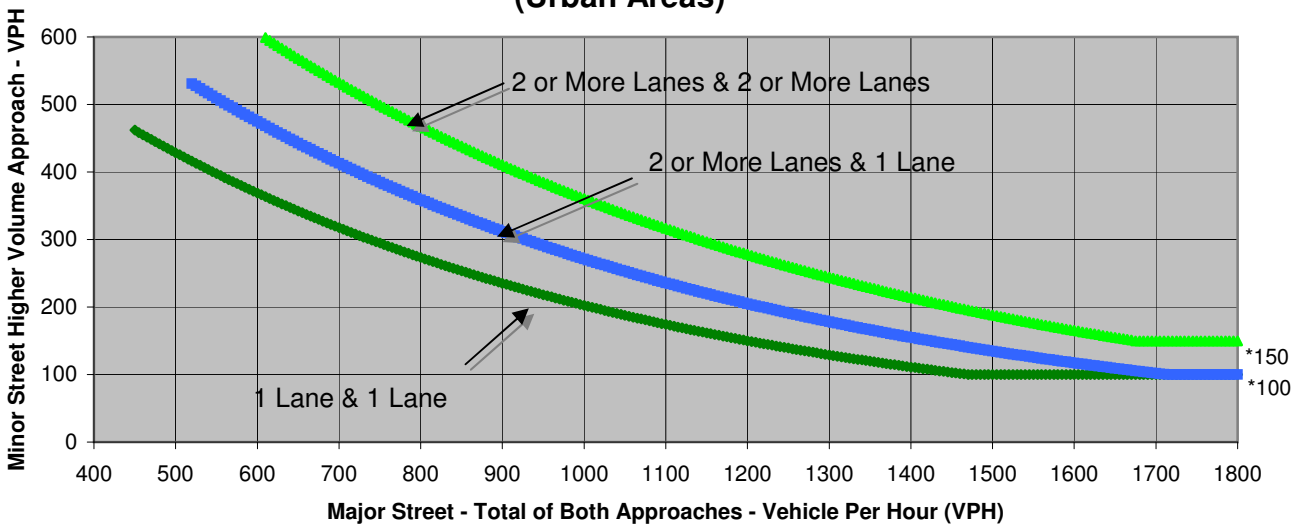
Turn Movement Volumes

	NB	SB	EB	WB
Left	40	370	470	125
Through	1,415	995	40	35
Right	180	675	15	670
Total	1,635	2,040	525	830

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	YES
Traffic Volume (VPH) *	3,675	830	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Wawona Street
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	AM

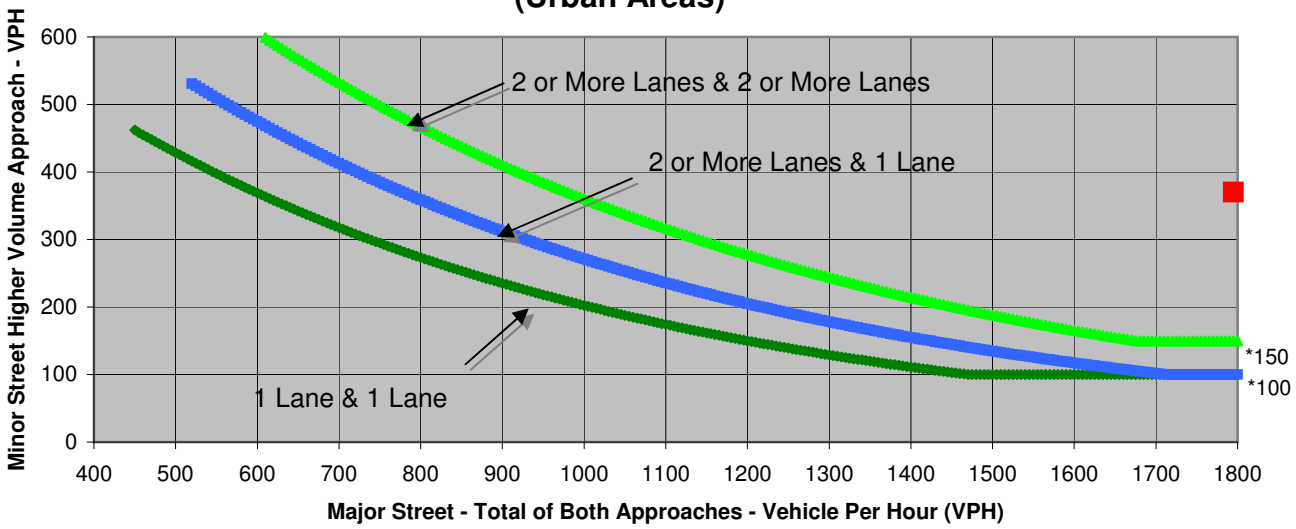
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	40	0	320
Through	715	945	0	0
Right	95	0	0	50
Total	810	985	0	370

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,795	370	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	AM

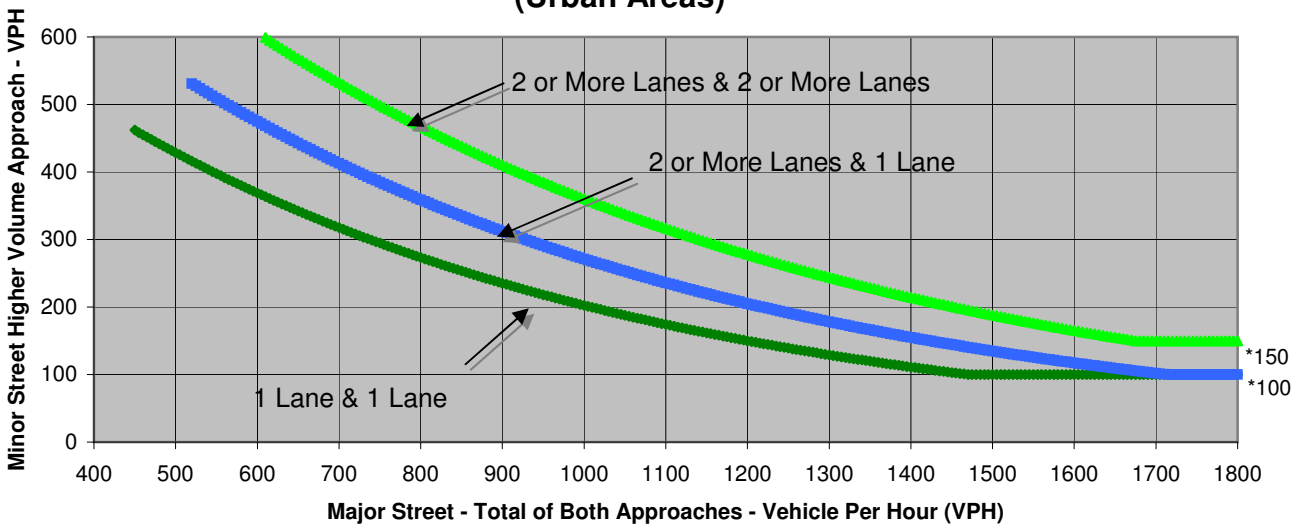
Turn Movement Volumes

	NB	SB	EB	WB
Left	20	130	200	80
Through	925	315	300	530
Right	25	690	40	510
Total	970	1,135	540	1,120

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,105	1,120	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Woodward Avenue

Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	AM

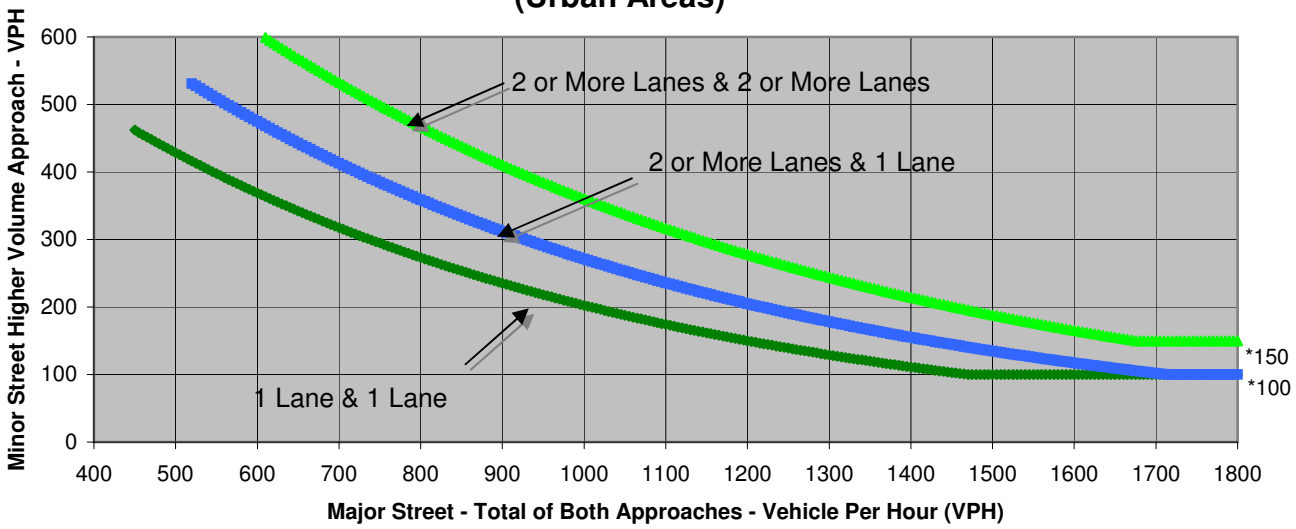
Turn Movement Volumes

	NB	SB	EB	WB
Left	110	245	380	40
Through	550	270	220	525
Right	80	145	55	600
Total	740	660	655	1,165

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	1,400	1,165	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Daniels Street
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	AM

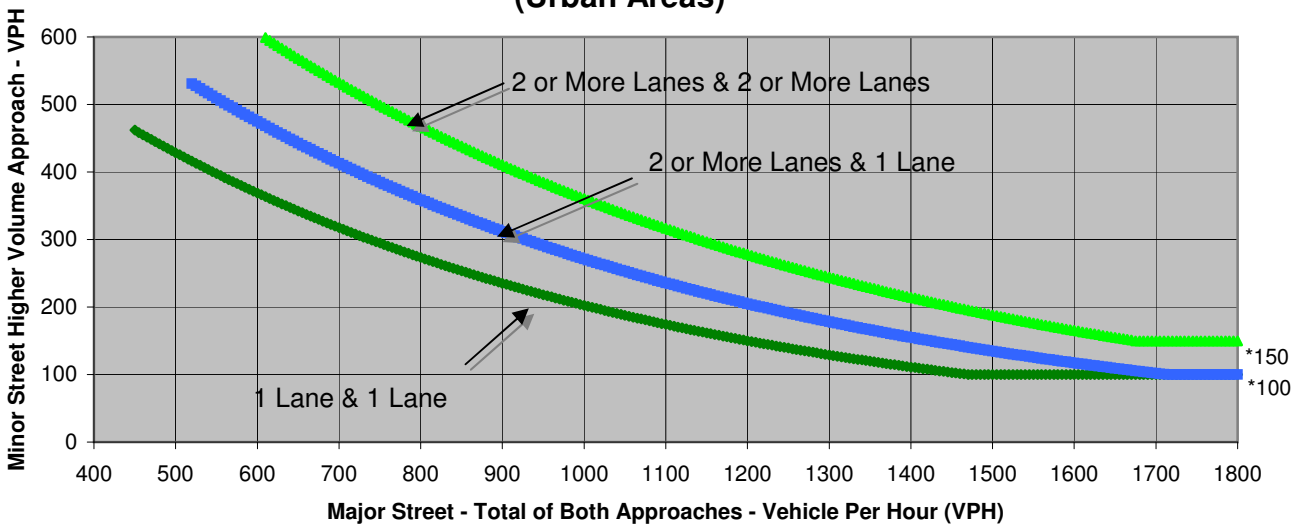
Turn Movement Volumes

	NB	SB	EB	WB
Left	90	0	40	0
Through	1,070	1,260	0	0
Right	0	30	140	0
Total	1,160	1,290	180	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Daniels Street	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,450	180	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	AM

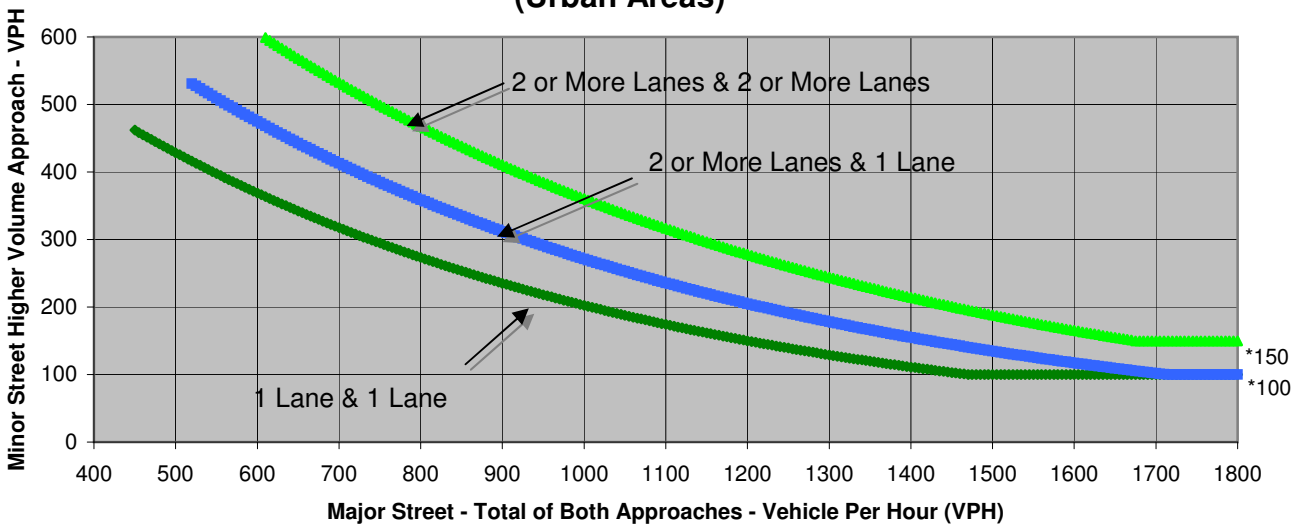
Turn Movement Volumes

	NB	SB	EB	WB
Left	250	85	165	50
Through	1,110	350	275	570
Right	40	140	70	170
Total	1,400	575	510	790

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

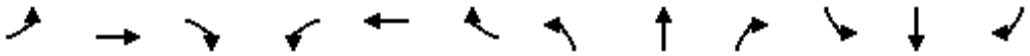


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	1,975	790	

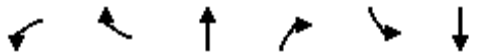
* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.93		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3419		1770	3308		1770	1827	1583	1770	1719	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3419		1770	3308		1770	1827	1583	1770	1719	
Volume (vph)	240	430	125	200	220	170	110	535	120	355	660	540
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)	253	453	132	211	232	179	116	563	126	374	695	568
RTOR Reduction (vph)	0	25	0	0	132	0	0	0	50	0	24	0
Lane Group Flow (vph)	253	560	0	211	279	0	116	563	76	374	1239	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	11.1	20.0		15.7	24.6		9.9	28.3	28.3	24.4	42.8	
Effective Green, g (s)	11.1	20.0		15.7	24.6		9.9	28.3	28.3	24.4	42.8	
Actuated g/C Ratio	0.11	0.19		0.15	0.24		0.09	0.27	0.27	0.23	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	188	655		266	779		168	495	429	414	705	
v/s Ratio Prot	c0.14	c0.16		c0.12	0.08		0.07	0.31		c0.21	c0.72	
v/s Ratio Perm									0.05			
v/c Ratio	1.35	0.85		0.79	0.36		0.69	1.14	0.18	0.90	1.76	
Uniform Delay, d1	46.7	40.8		42.8	33.3		45.8	38.1	29.1	38.9	30.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	186.6	10.6		14.9	0.3		11.6	84.0	0.9	22.5	346.6	
Delay (s)	233.3	51.4		57.7	33.6		57.3	122.0	30.1	61.4	377.4	
Level of Service	F	D		E	C		E	F	C	E	F	
Approach Delay (s)		106.3			41.8			98.3			305.2	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	177.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	104.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	114.1%	ICU Level of Service	H
Analysis Period (min)	15		

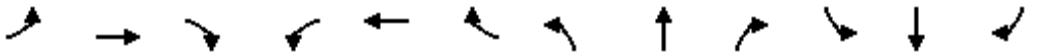
c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	320	50	715	95	40	945
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	337	53	753	100	42	995
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.74	0.74			0.74	
vC, conflicting volume	1884	807			855	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2196	738			803	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	83			93	
cM capacity (veh/h)	34	308			605	

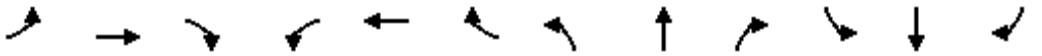
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	389	853	1037
Volume Left	337	0	42
Volume Right	53	100	0
cSH	39	1700	605
Volume to Capacity	10.09	0.50	0.07
Queue Length 95th (ft)	Err	0	6
Control Delay (s)	Err	0.0	2.3
Lane LOS	F		A
Approach Delay (s)	Err	0.0	2.3
Approach LOS	F		

Intersection Summary			
Average Delay	1709.9		
Intersection Capacity Utilization	109.7%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Volume (vph)	30	10	180	210	30	50	415	730	240	90	1045	130
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)	32	11	189	221	32	53	437	768	253	95	1100	137
RTOR Reduction (vph)	0	0	168	0	0	45	0	0	105	0	0	61
Lane Group Flow (vph)	32	11	21	221	32	8	437	768	148	95	1100	77
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.6	13.1	13.1	12.0	18.5	18.5	24.9	65.6	65.6	13.3	54.0	54.0
Effective Green, g (s)	6.6	13.1	13.1	12.0	18.5	18.5	24.9	65.6	65.6	13.3	54.0	54.0
Actuated g/C Ratio	0.05	0.11	0.11	0.10	0.15	0.15	0.21	0.55	0.55	0.11	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	189	203	171	343	287	241	712	1897	845	196	1562	702
v/s Ratio Prot	0.01	0.01		c0.06	c0.02		c0.13	0.22		0.05	c0.32	
v/s Ratio Perm			0.01			0.01			0.10			0.05
v/c Ratio	0.17	0.05	0.12	0.64	0.11	0.03	0.61	0.40	0.18	0.48	0.70	0.11
Uniform Delay, d1	54.1	47.9	48.3	51.9	43.7	43.2	43.2	15.8	13.6	50.1	26.6	19.1
Progression Factor	1.00	1.00	1.00	1.03	1.04	1.20	1.04	0.98	0.81	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.3	4.1	0.2	0.1	0.6	0.3	0.2	1.9	2.7	0.3
Delay (s)	54.5	48.0	48.6	57.4	45.5	52.0	45.3	15.8	11.3	52.0	29.3	19.4
Level of Service	D	D	D	E	D	D	D	B	B	D	C	B
Approach Delay (s)		49.4			55.2			23.9			29.9	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1770	1495	1770	1759			1759	1495
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1770	1495	1770	1759			1759	1495
Volume (vph)	0	0	0	1110	0	505	1160	880	0	0	765	670
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	0	0	1168	0	532	1221	926	0	0	805	705
RTOR Reduction (vph)	0	0	0	0	0	73	0	0	0	0	0	289
Lane Group Flow (vph)	0	0	0	0	1168	459	1221	926	0	0	805	416
Heavy Vehicles (%)	0%	2%	2%	2%	2%	8%	2%	8%	2%	2%	8%	8%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					46.0	46.0	14.0	66.0			48.0	48.0
Effective Green, g (s)					46.0	46.0	14.0	66.0			48.0	48.0
Actuated g/C Ratio					0.38	0.38	0.12	0.55			0.40	0.40
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					679	573	207	967			704	598
v/s Ratio Prot							c0.69	0.53			c0.46	
v/s Ratio Perm					0.66	0.31						0.28
v/c Ratio					1.72	0.80	5.90	0.96			1.14	0.70
Uniform Delay, d1					37.0	32.9	53.0	25.7			36.0	29.9
Progression Factor					1.00	1.00	1.27	0.31			0.70	1.19
Incremental Delay, d2					330.3	7.9	2205.3	3.2			77.0	4.8
Delay (s)					367.3	40.9	2272.6	11.3			102.4	40.3
Level of Service					F	D	F	B			F	D
Approach Delay (s)		0.0			265.1			1297.3			73.4	
Approach LOS		A			F			F			E	

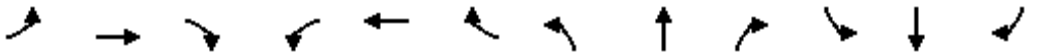
Intersection Summary			
HCM Average Control Delay	624.8	HCM Level of Service	F
HCM Volume to Capacity ratio	2.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	177.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1671	1583					1863	1583	1671	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1671	1583					1863	1583	1671	1863	
Volume (vph)	290	0	450	0	0	0	0	1750	805	285	1590	0
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)	305	0	474	0	0	0	0	1842	847	300	1674	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	0	179	0	0	0
Lane Group Flow (vph)	0	305	462	0	0	0	0	1842	668	300	1674	0
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		38.4	38.4					46.0	46.0	23.6	73.6	
Effective Green, g (s)		38.4	38.4					46.0	46.0	23.6	73.6	
Actuated g/C Ratio		0.32	0.32					0.38	0.38	0.20	0.61	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		535	507					714	607	329	1143	
v/s Ratio Prot								c0.99		0.18	c0.90	
v/s Ratio Perm		0.18	c0.29						0.42			
v/c Ratio		0.57	0.91					2.58	1.10	0.91	1.46	
Uniform Delay, d1		33.9	39.2					37.0	37.0	47.2	23.2	
Progression Factor		1.00	1.00					1.00	1.00	0.25	0.44	
Incremental Delay, d2		1.5	20.5					715.0	66.8	4.0	209.5	
Delay (s)		35.4	59.7					752.0	103.8	15.6	219.7	
Level of Service		D	E					F	F	B	F	
Approach Delay (s)		50.2			0.0			547.9			188.7	
Approach LOS		D			A			F			F	

Intersection Summary			
HCM Average Control Delay	346.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	177.2%	ICU Level of Service	H
Analysis Period (min)	15		

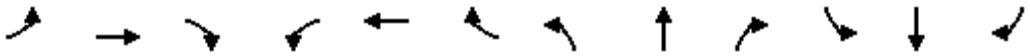
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	470	40	15	125	35	670	40	1415	180	370	995	675
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	495	42	16	132	37	705	42	1489	189	389	1047	711
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											720	
pX, platoon unblocked	0.43	0.43	0.43	0.43	0.43		0.43					
vC, conflicting volume	3771	3589	1047	3429	4111	1489	1758			1679		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	7423	7002	1110	6630	8210	1489	2757			1679		
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	0	86	0	0	0	32			0		
cM capacity (veh/h)	0	0	110	0	0	152	62			381		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	553	132	742	42	1489	189	389	1047	711
Volume Left	495	132	0	42	0	0	389	0	0
Volume Right	16	0	705	0	0	189	0	0	711
cSH	0	0	0	62	1700	1700	381	1700	1700
Volume to Capacity	Err	Err	Err	0.68	0.88	0.11	1.02	0.62	0.42
Queue Length 95th (ft)	Err	Err	Err	73	0	0	315	0	0
Control Delay (s)	Err	Err	Err	142.1	0.0	0.0	85.3	0.0	0.0
Lane LOS	F	F	F	F			F		
Approach Delay (s)	Err	Err		3.5			15.5		
Approach LOS	F	F							

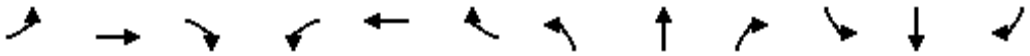
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	154.1%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	200	300	40	80	530	510	20	925	25	130	315	690
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	211	316	42	84	558	537	21	974	26	137	332	726

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	568	1179	1021	1195
Volume Left (vph)	211	84	21	137
Volume Right (vph)	42	537	26	726
Hadj (s)	0.06	-0.22	0.02	-0.31
Departure Headway (s)	9.6	9.3	9.6	9.3
Degree Utilization, x	1.52	3.06	2.72	3.07
Capacity (veh/h)	386	398	386	401
Control Delay (s)	272.1	952.5	801.1	958.4
Approach Delay (s)	272.1	952.5	801.1	958.4
Approach LOS	F	F	F	F

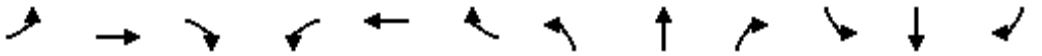
Intersection Summary			
Delay	817.7		
HCM Level of Service	F		
Intersection Capacity Utilization	215.8%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3384		1770	3270		1770	3365	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3384		1770	3270		1770	3365	
Volume (vph)	150	400	185	295	170	70	190	540	160	70	470	230
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)	158	421	195	311	179	74	200	568	168	74	495	242
RTOR Reduction (vph)	0	0	143	0	57	0	0	32	0	0	72	0
Lane Group Flow (vph)	158	421	52	311	196	0	200	704	0	74	665	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	9.4	20.5	20.5	6.0	17.1		11.7	27.8		6.0	22.1	
Effective Green, g (s)	9.4	20.5	20.5	6.0	17.1		11.7	27.8		6.0	22.1	
Actuated g/C Ratio	0.12	0.27	0.27	0.08	0.22		0.15	0.36		0.08	0.29	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	218	501	425	139	758		271	1191		139	975	
v/s Ratio Prot	0.09	c0.23		c0.18	0.06		c0.11	0.22		0.04	c0.20	
v/s Ratio Perm			0.03									
v/c Ratio	0.72	0.84	0.12	2.24	0.26		0.74	0.59		0.53	0.68	
Uniform Delay, d1	32.2	26.4	21.1	35.1	24.4		30.8	19.6		33.8	24.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.3	12.0	0.1	579.3	0.2		10.0	2.2		3.9	3.9	
Delay (s)	43.5	38.4	21.2	614.5	24.6		40.9	21.8		37.7	27.9	
Level of Service	D	D	C	F	C		D	C		D	C	
Approach Delay (s)		35.1			349.9			25.9			28.7	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM Average Control Delay	88.2	HCM Level of Service	F
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

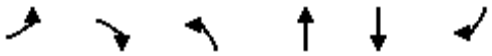
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.93		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1669		1770	1732		1770	3304		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1669		1770	1732		1770	3304		1770	1863	1583
Volume (vph)	80	90	205	205	90	80	155	800	110	120	900	20
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)	84	95	216	216	95	84	163	842	116	126	947	21
RTOR Reduction (vph)	0	132	0	0	50	0	0	14	0	0	0	13
Lane Group Flow (vph)	84	179	0	216	129	0	163	944	0	126	947	8
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	4.7	12.4		6.0	13.7		6.0	22.8		6.3	23.1	4.7
Effective Green, g (s)	4.7	12.4		6.0	13.7		6.0	22.8		6.3	23.1	4.7
Actuated g/C Ratio	0.07	0.20		0.09	0.22		0.09	0.36		0.10	0.36	0.07
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	131	326		167	374		167	1186		176	678	117
v/s Ratio Prot	0.05	c0.11		c0.12	0.07		c0.09	0.29		0.07	c0.51	0.01
v/s Ratio Perm												
v/c Ratio	0.64	0.55		1.29	0.34		0.98	0.80		0.72	1.40	0.07
Uniform Delay, d1	28.6	23.0		28.8	21.1		28.7	18.3		27.7	20.2	27.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.3	1.9		169.1	0.6		62.0	5.6		13.0	187.4	0.2
Delay (s)	38.8	24.9		197.9	21.7		90.6	23.8		40.7	207.6	27.6
Level of Service	D	C		F	C		F	C		D	F	C
Approach Delay (s)		27.9			118.0			33.6			185.0	
Approach LOS		C			F			C			F	

Intersection Summary			
HCM Average Control Delay	99.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		

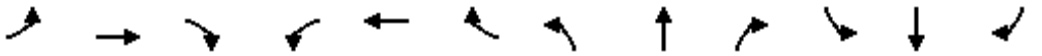
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	40	140	90	1070	1260	30
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	147	95	1126	1326	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				306		
pX, platoon unblocked	0.76					
vC, conflicting volume	2658	1342	1358			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3168	1342	1358			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	21	81			
cM capacity (veh/h)	7	186	506			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	189	1221	1358
Volume Left	42	95	0
Volume Right	147	0	32
cSH	29	506	1700
Volume to Capacity	6.60	0.19	0.80
Queue Length 95th (ft)	Err	17	0
Control Delay (s)	Err	8.1	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	8.1	0.0
Approach LOS	F		

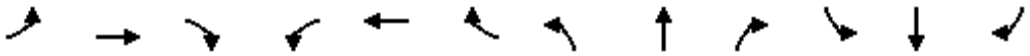
Intersection Summary			
Average Delay	687.9		
Intersection Capacity Utilization	148.2%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1671	1583	1770	1759			1863	1583
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1671	1583	1770	1759			1863	1583
Volume (vph)	0	0	0	205	0	350	795	810	0	0	740	660
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	0	0	216	0	368	837	853	0	0	779	695
RTOR Reduction (vph)	0	0	0	0	0	205	0	0	0	0	0	267
Lane Group Flow (vph)	0	0	0	0	216	163	837	853	0	0	779	428
Heavy Vehicles (%)	2%	2%	2%	8%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					19.3	19.3	29.8	92.7			58.9	58.9
Effective Green, g (s)					19.3	19.3	29.8	92.7			58.9	58.9
Actuated g/C Ratio					0.16	0.16	0.25	0.77			0.49	0.49
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					269	255	440	1359			914	777
v/s Ratio Prot							c0.47	0.48			c0.42	
v/s Ratio Perm					0.13	0.10						0.27
v/c Ratio					0.80	0.64	1.90	0.63			0.85	0.55
Uniform Delay, d1					48.5	47.1	45.1	6.0			26.7	21.3
Progression Factor					1.00	1.00	0.87	0.22			1.00	1.00
Incremental Delay, d2					15.7	5.4	406.8	0.2			9.9	2.8
Delay (s)					64.3	52.5	446.1	1.5			36.6	24.1
Level of Service					E	D	F	A			D	C
Approach Delay (s)		0.0			56.9			221.7			30.7	
Approach LOS		A			E			F			C	

Intersection Summary			
HCM Average Control Delay	120.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1495					1759	1495	1770	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1495					1759	1495	1770	1863	
Volume (vph)	220	0	355	0	0	0	0	1385	230	270	675	0
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)	232	0	374	0	0	0	0	1458	242	284	711	0
RTOR Reduction (vph)	0	0	156	0	0	0	0	0	55	0	0	0
Lane Group Flow (vph)	0	232	218	0	0	0	0	1458	187	284	711	0
Heavy Vehicles (%)	2%	2%	8%	2%	2%	2%	2%	8%	8%	2%	2%	8%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		21.7	21.7					49.0	49.0	37.3	90.3	
Effective Green, g (s)		21.7	21.7					49.0	49.0	37.3	90.3	
Actuated g/C Ratio		0.18	0.18					0.41	0.41	0.31	0.75	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		320	270					718	610	550	1402	
v/s Ratio Prot								c0.83		0.16	c0.38	
v/s Ratio Perm		0.13	c0.15						0.13			
v/c Ratio		0.72	0.81					2.03	0.31	0.52	0.51	
Uniform Delay, d1		46.3	47.2					35.5	24.0	33.9	5.9	
Progression Factor		1.00	1.00					1.00	1.00	0.76	0.05	
Incremental Delay, d2		7.9	16.1					468.7	1.3	0.4	0.7	
Delay (s)		54.3	63.3					504.2	25.3	26.4	1.0	
Level of Service		D	E					F	C	C	A	
Approach Delay (s)		59.8			0.0			436.0			8.2	
Approach LOS		E			A			F			A	

Intersection Summary			
HCM Average Control Delay	238.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

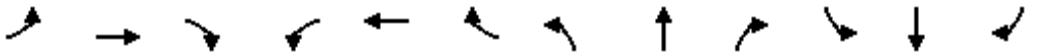
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.88	0.95	0.88	0.97	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	2787	3539	2787	3433	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	2787	3539	2787	3433	3539
Volume (vph)	80	295	1320	125	535	495
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	311	1389	132	563	521
RTOR Reduction (vph)	0	280	0	55	0	0
Lane Group Flow (vph)	84	31	1389	77	563	521
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	8.8	8.8	49.0	49.0	17.2	70.2
Effective Green, g (s)	8.8	8.8	49.0	49.0	17.2	70.2
Actuated g/C Ratio	0.10	0.10	0.56	0.56	0.20	0.81
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	347	282	1993	1570	679	2856
v/s Ratio Prot	c0.02		c0.39		c0.16	0.15
v/s Ratio Perm		0.01		0.03		
v/c Ratio	0.24	0.11	0.70	0.05	0.83	0.18
Uniform Delay, d1	36.0	35.5	13.7	8.5	33.5	1.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2	2.0	0.1	8.3	0.1
Delay (s)	36.4	35.7	15.7	8.6	41.8	2.0
Level of Service	D	D	B	A	D	A
Approach Delay (s)	35.9		15.1			22.7
Approach LOS	D		B			C

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection has too many lanes per leg.

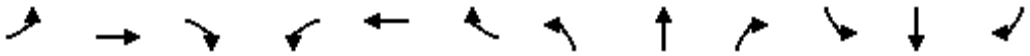
HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.



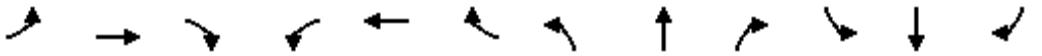
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1488
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1488
Volume (vph)	0	0	0	260	0	310	520	935	0	0	410	965
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	0	0	274	0	326	547	984	0	0	432	1016
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	452
Lane Group Flow (vph)	0	0	0	0	274	326	547	984	0	0	432	564
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					22.7	120.0	46.3	89.3			39.0	39.0
Effective Green, g (s)					22.7	120.0	46.3	89.3			39.0	39.0
Actuated g/C Ratio					0.19	1.00	0.39	0.74			0.32	0.32
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					328	1492	670	1334			582	484
v/s Ratio Prot					c0.16		c0.32	0.55			0.24	
v/s Ratio Perm						0.22						c0.38
v/c Ratio					0.84	0.22	0.82	0.74			0.74	1.16
Uniform Delay, d1					46.9	0.0	33.0	8.7			36.0	40.5
Progression Factor					1.00	1.00	0.06	0.20			1.00	1.00
Incremental Delay, d2					16.6	0.3	0.7	0.3			8.3	94.7
Delay (s)					63.4	0.3	2.6	2.1			44.3	135.2
Level of Service					E	A	A	A			D	F
Approach Delay (s)		0.0			29.1			2.3			108.1	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	49.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	125.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.96		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1517					1731		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1517					1731		1703	1827	
Volume (vph)	515	0	460	0	0	0	0	940	460	170	500	0
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)	542	0	484	0	0	0	0	989	484	179	526	0
RTOR Reduction (vph)	0	0	189	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	542	295	0	0	0	0	1460	0	179	526	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		39.4	39.4					48.8		19.8	72.6	
Effective Green, g (s)		39.4	39.4					48.8		19.8	72.6	
Actuated g/C Ratio		0.33	0.33					0.41		0.17	0.60	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		559	498					704		281	1105	
v/s Ratio Prot		c0.32						c0.84		c0.11	0.29	
v/s Ratio Perm			0.19									
v/c Ratio		0.97	0.59					2.07		0.64	0.48	
Uniform Delay, d1		39.7	33.6					35.6		46.7	13.1	
Progression Factor		1.00	1.00					1.00		1.35	0.23	
Incremental Delay, d2		30.1	1.9					488.1		3.1	0.9	
Delay (s)		69.8	35.5					523.7		66.0	3.9	
Level of Service		E	D					F		E	A	
Approach Delay (s)		53.6			0.0			523.7			19.7	
Approach LOS		D			A			F			B	

Intersection Summary			
HCM Average Control Delay	262.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	125.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	120	0	70	0	0	0	250	1280	0	0	590	370
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	126	0	74	0	0	0	263	1347	0	0	621	389
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	2495	2495	621	2568	2884	1347	1011			1347		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2616	2616	590	2695	3037	1347	1011			1347		
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	100	84	100	100	100	59			100		
cM capacity (veh/h)	10	13	469	7	7	185	634			511		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	126	74	0	263	1347	621	389
Volume Left	126	0	0	263	0	0	0
Volume Right	0	74	0	0	0	0	389
cSH	10	469	1700	634	1700	1700	1700
Volume to Capacity	12.57	0.16	0.00	0.41	0.79	0.37	0.23
Queue Length 95th (ft)	Err	14	0	51	0	0	0
Control Delay (s)	Err	14.1	0.0	14.6	0.0	0.0	0.0
Lane LOS	F	B	A	B			
Approach Delay (s)	6320.4		0.0	2.4		0.0	
Approach LOS	F		A				

Intersection Summary				
Average Delay	449.5			
Intersection Capacity Utilization	80.7%	ICU Level of Service	D	
Analysis Period (min)	15			

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec):	100	Critical Vol./Cap.(X):	3.455
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	480.9
Optimal Cycle:	0	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Volume Module:												
Base Vol:	250	1110	40	85	350	140	165	275	70	50	570	170
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	250	1110	40	85	350	140	165	275	70	50	570	170
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	250	1110	40	85	350	140	165	275	70	50	570	170
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	250	1110	40	85	350	140	165	275	70	50	570	170
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	250	1110	40	85	350	140	165	275	70	50	570	170
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	250	1110	40	85	350	140	165	275	70	50	570	170
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	306	321	336	296	315	330	298	312	329	296	315	331
Capacity Analysis Module:												
Vol/Sat:	0.82	3.45	0.12	0.29	1.11	0.42	0.55	0.88	0.21	0.17	1.81	0.51
Crit Moves:	****			****			****			****		
Delay/Veh:	50.1	1134	14.6	19.2	118	20.9	28.4	59.7	16.4	17.0	403	24.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	50.1	1134	14.6	19.2	118	20.9	28.4	59.7	16.4	17.0	403	24.0
LOS by Move:	F	F	B	C	F	C	D	F	C	C	F	C
ApproachDel:	908.6			80.0			43.6			297.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	908.6			80.0			43.6			297.1		
LOS by Appr:	F			F			E			F		
AllWayAvgQ:	3.0	100	0.1	0.4	9.1	0.7	1.1	3.9	0.3	0.2	34.0	1.0

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #14

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0432			0.0432			0.0000			0.0432		
P[C5]:	0.9568			0.9568			1.0000			0.9568		
Padj[C1]:	0.03957			0.03957			0.04000			0.03957		
Padj[C2]:	0.02957			0.02957			0.03000			0.02957		
Padj[C3]:	0.01957			0.01957			0.02000			0.01957		
Padj[C4]:	0.00698			0.00698			0.01000			0.00698		
Padj[C5]:	-0.09568			-0.09568			-0.10000			-0.09568		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	250	40		85	140		165	70		50	170	
Capacity:	306	336		296	330		298	329		296	331	
DegOfUtil:	0.81	0.12		0.28	0.42		0.55	0.21		0.17	0.51	
DepHeadway:	11.71	10.51		11.92	10.72		12.00	10.80		11.94	10.74	
ServiceTime:	9.4	8.2		9.6	8.4		9.7	8.5		9.6	8.4	
Delay:	50.1	14.6		19.2	20.9		28.4	16.4		17.0	24.0	
Queue:	3.0	0.1		0.4	0.7		1.1	0.3		0.2	1.0	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	1110			350			275			570		
Capacity:	321			315			312			315		
DegOfUtil:	3.45			1.11			0.88			1.81		
DepHeadway:	11.21			11.42			11.50			11.44		
ServiceTime:	8.9			9.1			9.2			9.1		
Delay:	1134.2			118.5			59.7			403.2		
Queue:	100.0			9.1			3.9			34.0		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	908.6			80.0			43.6			297.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	908.6			80.0			43.6			297.1		
LOS by Appr:	F			F			E			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	480.9
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	250	1110	40	85	350	140	165	275	70	50	570	170

Major Street Volume: 1975
Minor Approach Volume: 790
Minor Approach Volume Threshold: 81 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec):	100	Critical Vol./Cap.(X):	1.879
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	252.7
Optimal Cycle:	0	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	110	550	80	245	270	145	380	220	55	40	525	600
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	110	550	80	245	270	145	380	220	55	40	525	600
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	110	550	80	245	270	145	380	220	55	40	525	600
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	110	550	80	245	270	145	380	220	55	40	525	600
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	550	80	245	270	145	380	220	55	40	525	600
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	110	550	80	245	270	145	380	220	55	40	525	600
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	279	293	307	290	303	321	286	297	313	287	303	322
Capacity Analysis Module:												
Vol/Sat:	0.39	1.88	0.26	0.84	0.89	0.45	1.33	0.74	0.18	0.14	1.73	1.86
Crit Moves:		****			****			****				****
Delay/Veh:	23.5	435	18.3	56.5	63.0	22.7	202.5	42.3	16.4	17.0	369	424.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	23.5	435	18.3	56.5	63.0	22.7	202.5	42.3	16.4	17.0	369	424.1
LOS by Move:	C	F	C	F	F	C	F	E	C	C	F	F
ApproachDel:	328.8			51.7			133.0			385.4		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	328.8			51.7			133.0			385.4		
LOS by Appr:	F			F			F			F		
AllWayAvgQ:	0.6	34.2	0.3	3.3	4.1	0.8	14.9	2.3	0.2	0.2	29.9	36.7

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

****

Intersection #18

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0097			0.0000			0.0097			0.0097		
P[C5]:	0.9903			1.0000			0.9903			0.9903		
Padj[C1]:	0.03990			0.04000			0.03990			0.03990		
Padj[C2]:	0.02990			0.03000			0.02990			0.02990		
Padj[C3]:	0.01990			0.02000			0.01990			0.01990		
Padj[C4]:	0.00932			0.01000			0.00932			0.00932		
Padj[C5]:	-0.09903			-0.10000			-0.09903			-0.09903		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	110	80		245	145		380	55		40	600	
Capacity:	279	307		290	321		286	313		287	322	
DegOfUtil:	0.39	0.26		0.84	0.45		1.33	0.17		0.14	1.86	
DepHeadway:	12.80	11.60		12.36	11.16		12.57	11.37		12.37	11.17	
ServiceTime:	10.5	9.3		10.1	8.9		10.3	9.1		10.1	8.9	
Delay:	23.5	18.3		56.5	22.7		202.5	16.4		17.0	424.1	
Queue:	0.6	0.3		3.3	0.8		14.9	0.2		0.2	36.7	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	550			270			220			525		
Capacity:	293			303			297			303		
DegOfUtil:	1.88			0.89			0.74			1.73		
DepHeadway:	12.30			11.86			12.07			11.87		
ServiceTime:	10.0			9.6			9.8			9.6		
Delay:	435.1			63.0			42.3			369.3		
Queue:	34.2			4.1			2.3			29.9		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	328.8			51.7			133.0			385.4		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	328.8			51.7			133.0			385.4		
LOS by Appr:	F			F			F			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	252.7
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	110	550	80	245	270	145	380	220	55	40	525	600

Major Street Volume: 1820
Minor Approach Volume: 740
Minor Approach Volume Threshold: 117 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Cumulative No Project PM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7004	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1903	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2626	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2626	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Airport
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Commercial EIR

Flow Inputs and Adjustments

Volume, V	8106	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2203	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	3084	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3084	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7576	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2059	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2882	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2882	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6456	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1754	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2456	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2456	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5141	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1397	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1956	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1956	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.1	mi/h
Number of lanes, N	3	
Density, D	31.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4343	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1180	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1652	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1652	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	3	
Density, D	25.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4393	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1194	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1671	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1671	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	3	
Density, D	25.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4518	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1228	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1719	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1719	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.4	mi/h
Number of lanes, N	3	
Density, D	26.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4398	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1195	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1673	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1673	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	3	
Density, D	25.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4848	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1289	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1779	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1779	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.1	mi/h
Number of lanes, N	3	
Density, D	27.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6163	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1622	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2314	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2314	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	53.5	mi/h
Number of lanes, N	3	
Density, D	43.2	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to Lathrop
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4115	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1083	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2317	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2317	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	53.4	mi/h
Number of lanes, N	2	
Density, D	43.4	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Lahtrop to Yosemite
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6272	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1651	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	3532	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3532	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	8231	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2166	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	3090	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3090	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	8729	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2297	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	3277	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3277	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8106	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	2060	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8106	2060		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	2203	644		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9251	2639		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.407 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 5332$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	9251	7050	Yes
$v_{FO} = v - v_R$	6612	7050	No
v_R	2639	2000	Yes

$v_{3 \text{ or } av34} = v_R$ 3919 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 6551$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	6551	4600	No !

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 59.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $D_S = 0.666$

Space mean speed in ramp influence area, $S_R = 49.7$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 53.3$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6046	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1530	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6046	1530		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1643	416		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6900	1705		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 4081$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8605	7050	Yes

$v_{3 \text{ or } av34} = v_{FO} = 2819$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 4200$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4200	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_{R12} + 0.0078 v_{R12A} - 0.00627 L_A = 47.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 1.717$

Space mean speed in ramp influence area, $S_R = 25.5$ mph

Space mean speed in outer lanes, $S_0 = 56.1$ mph

Space mean speed for all vehicles, $S = 30.8$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7576	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1510	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7576	1510		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	2059	472		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	8647	1935		pcph

Estimation of V12 Diverge Areas

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

P = 0.455 Using Equation 5

FD
$v_{12} = v_R + (v_F - v_R) P_{FD} = 4988$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8647	7050	Yes
$v_{FO} = v_F - v_R$	6712	7050	No
v_R	1935	2000	No

$v_{3 \text{ or } av34} = v_R$ 3659 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 5947$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5947	4600	No !

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 54.0$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $D_S = 0.602$

Space mean speed in ramp influence area, $S_R = 51.2$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 54.7$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6066	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	390	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6066	390		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1648	106		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6923	435		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 4095 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	7358	7050	Yes

FO
v v 2828 pc/h (Equation 25-4 or 25-5)
3 or av34
Is v v > 2700 pc/h? Yes
3 or av34
Is v v > 1.5 v /2 No
3 or av34 12
If yes, v = 4223 (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	4223	4400	No

12A !

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 38.5 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence F

_____Speed Estimation_____

Intermediate speed variable, M = 0.697
S
Space mean speed in ramp influence area, S = 49.0 mph
R
Space mean speed in outer lanes, S = 56.1 mph
0
Space mean speed for all vehicles, S = 51.4 mph

_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4393	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	595	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4393	595		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1194	157		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	5014	642		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.605 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3288$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5014	7050	No
$v_{FO} = v - v_R$	4372	7050	No
v_R	642	2000	No

$v_{3 \text{ or } av34} = v_R$ 1726 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3288	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 31.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.486$

Space mean speed in ramp influence area, $S_R = 53.8$ mph

Space mean speed in outer lanes, $S_0 = 68.5$ mph

Space mean speed for all vehicles, $S = 58.1$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3798	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3798	720		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1032	196		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4335	802		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 2564 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	5137	7050	No
FO			
v v	1771 pc/h	(Equation 25-4 or 25-5)	
3 or av34			
Is v v	> 2700 pc/h?	No	
3 or av34			
Is v v	> 1.5 v /2	No	
3 or av34	12		
If yes, v =		(Equation 25-8)	
12A			

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	2564	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 28.2 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence D

_____Speed Estimation_____

Intermediate speed variable, M = 0.399
S
Space mean speed in ramp influence area, S = 55.8 mph
R
Space mean speed in outer lanes, S = 60.4 mph
0
Space mean speed for all vehicles, S = 57.3 mph

_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4518	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1320	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4518	1320		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1228	347		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	5156	1424		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.566 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3535$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5156	7050	No
$v_{FO} = v - v_R$	3732	7050	No
v_R	1424	2000	No
$v_{3 \text{ or } av34}$	1621 pc/h	(Equation 25-15 or 25-16)	

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3535	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 33.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.556$

Space mean speed in ramp influence area, $S_R = 52.2$ mph

Space mean speed in outer lanes, $S_0 = 68.9$ mph

Space mean speed for all vehicles, $S = 56.5$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative Conditions
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3198	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1200	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3198	1200		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	869	326		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%		%
Length	mi	mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3650	1337		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 2159 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v FO	4987	7050	No

v v 1491 pc/h (Equation 25-4 or 25-5)
3 or av34

Is v v > 2700 pc/h? No
3 or av34

Is v v > 1.5 v /2 No
3 or av34 12

If yes, v = (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v 12	2159	4400	No !

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 29.0 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence D

_____Speed Estimation_____

Intermediate speed variable, M = 0.415
S

Space mean speed in ramp influence area, S = 55.5 mph
R

Space mean speed in outer lanes, S = 61.4 mph
0

Space mean speed for all vehicles, S = 57.1 mph

_____

Leisch Method for Weaving Analysis

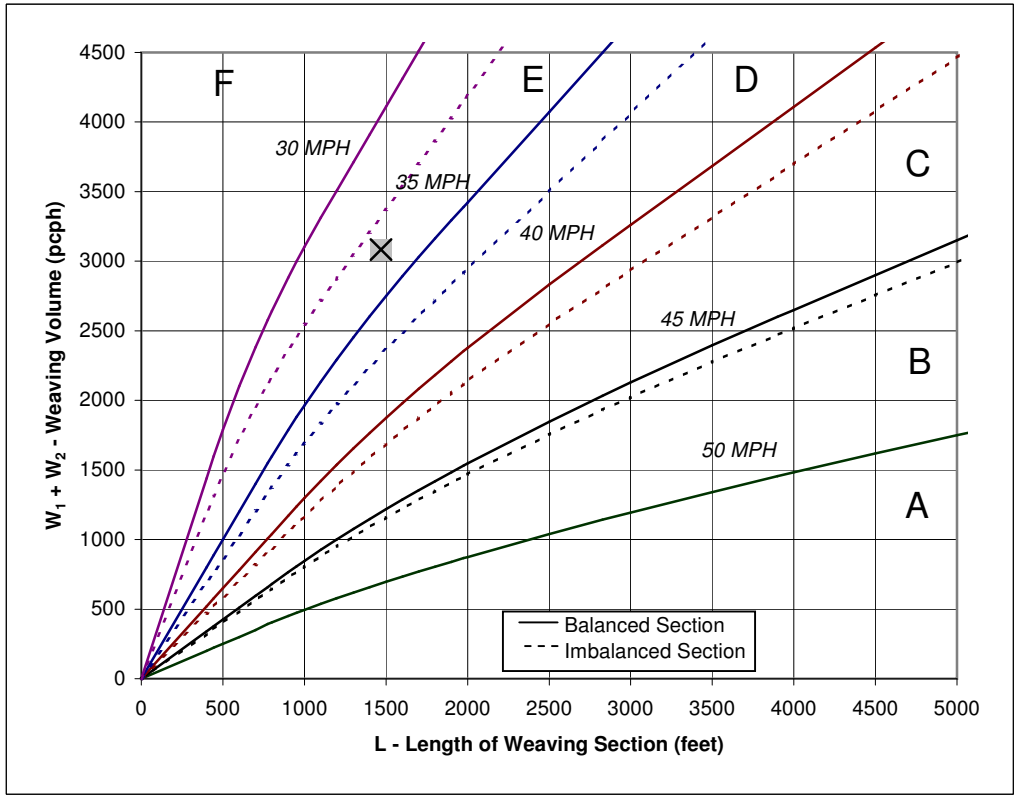
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

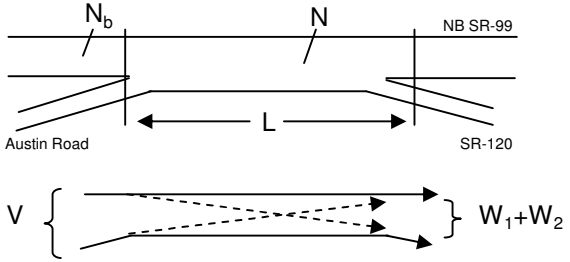
Project Information

Project	Union Crossing
Scenario	Cumulative NO PROJECT - PM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,713	Volume (vph)*	119	Volume (vph)*	1,877
Truck Percentage	14%	Truck Percentage	6%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	6,584	Volume (pcph)	380	Volume (pcph)	2,704



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **32.8**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,836**
6. Level of Service (LOS) **E**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

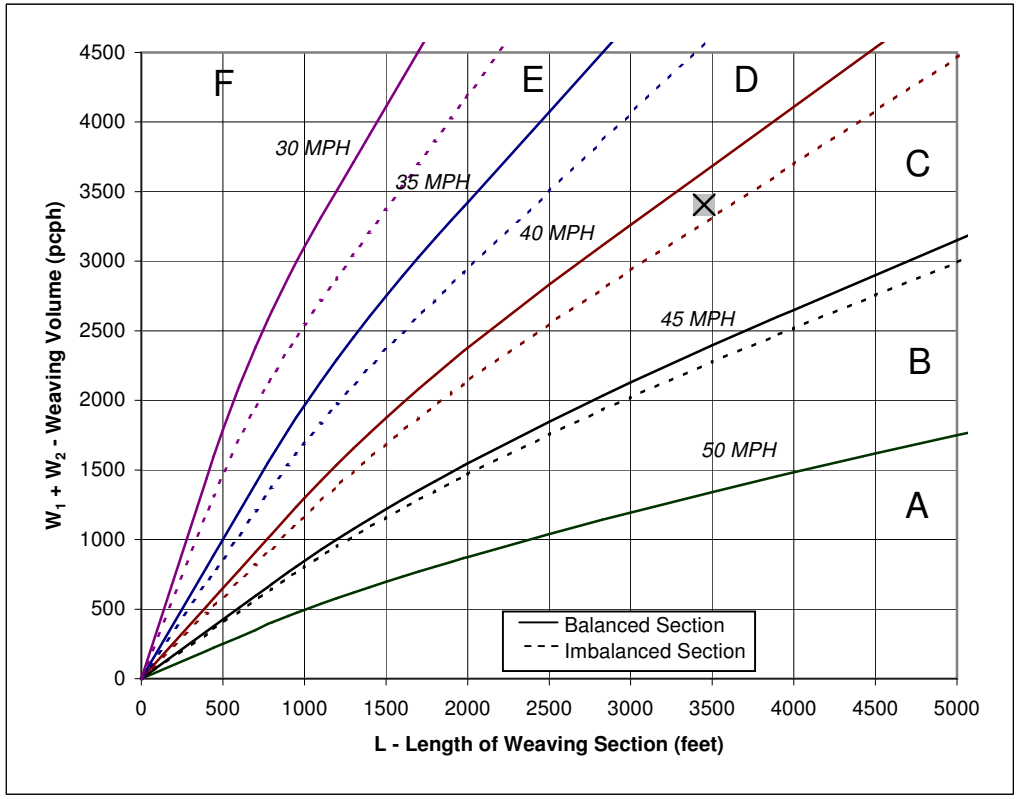
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

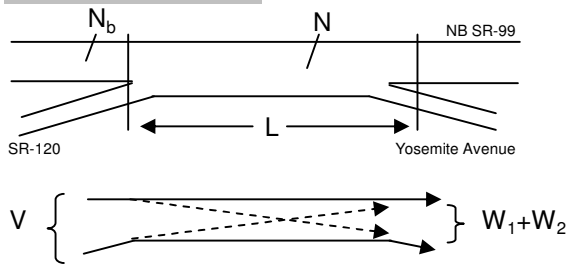
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,551	Volume (vph)*	715	Volume (vph)*	1,000
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	5,196	Volume (pcph)	1,350	Volume (pcph)	2,055

Project Information

Project	Union Crossing
Scenario	Cumulative NO PROJECT - PM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **40.0**
4. Weaving Intensity Factor (k) **2.54**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,424**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

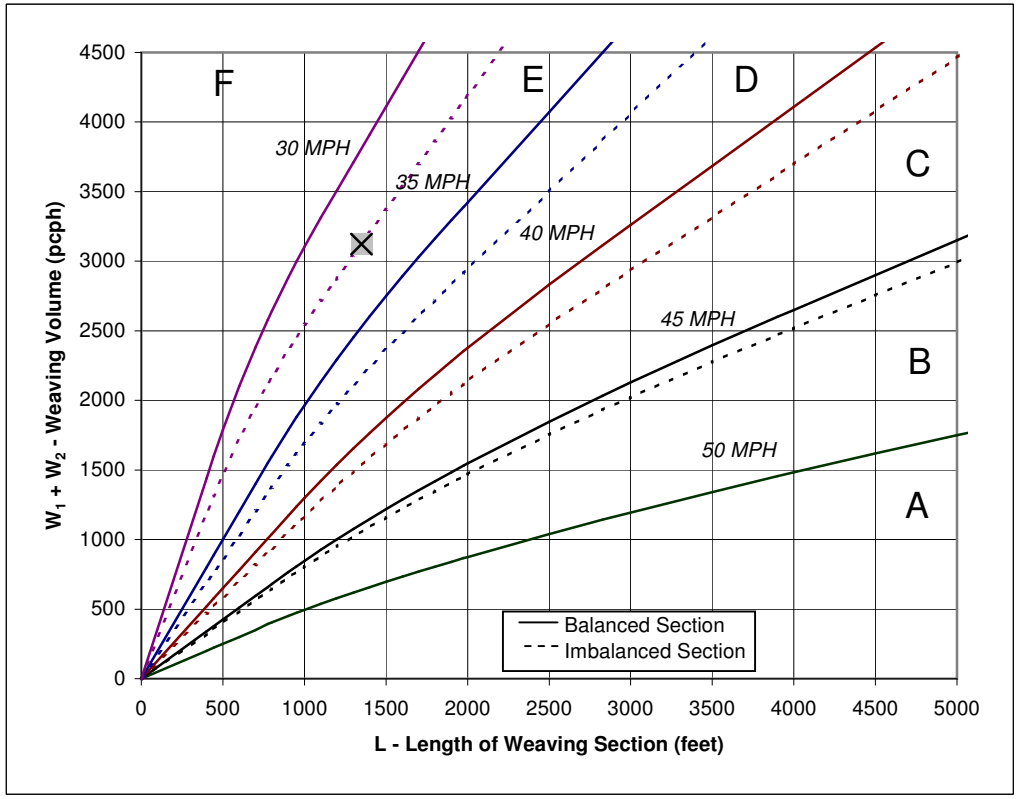
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

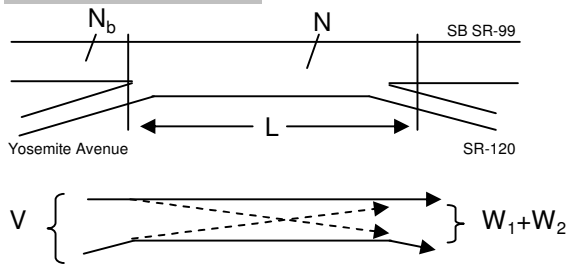
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,383	Volume (vph)*	777	Volume (vph)*	400
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	6,752	Volume (pcph)	1,483	Volume (pcph)	1,639

Project Information

Project	Union Crossing
Scenario	Cumulative NO PROJECT - PM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **23.6**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **3,239**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Cumulative No Project
Peak Hour PM

Major Street Airport Way
Minor Street Atherton Drive

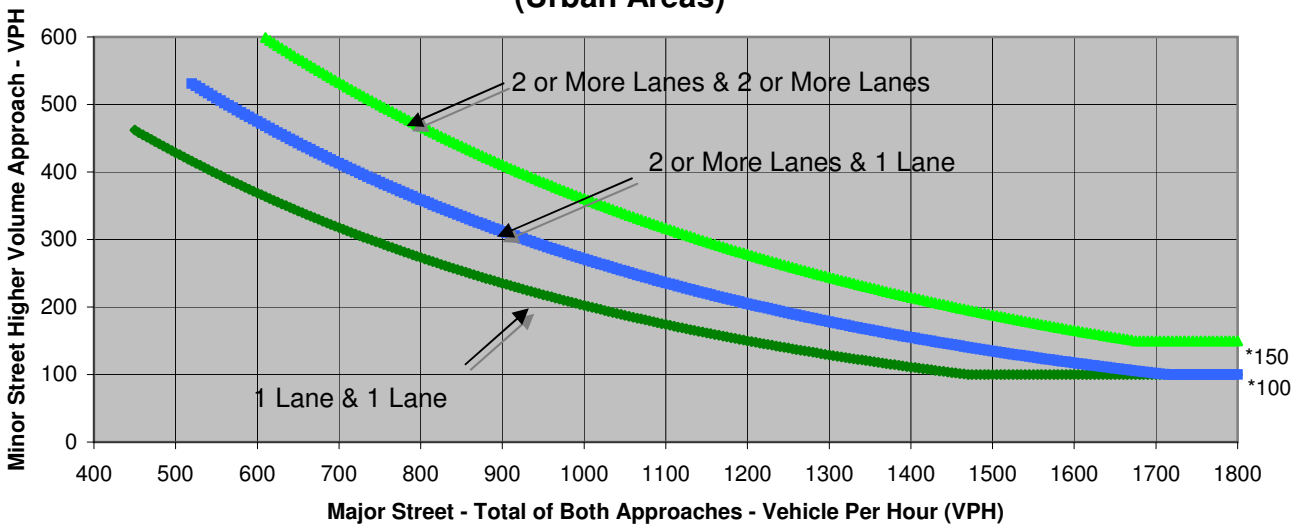
Turn Movement Volumes

	NB	SB	EB	WB
Left	40	370	470	125
Through	1,415	995	40	35
Right	180	675	15	670
Total	1,635	2,040	525	830

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	YES
Traffic Volume (VPH) *	3,675	830	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Wawona Street
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	PM

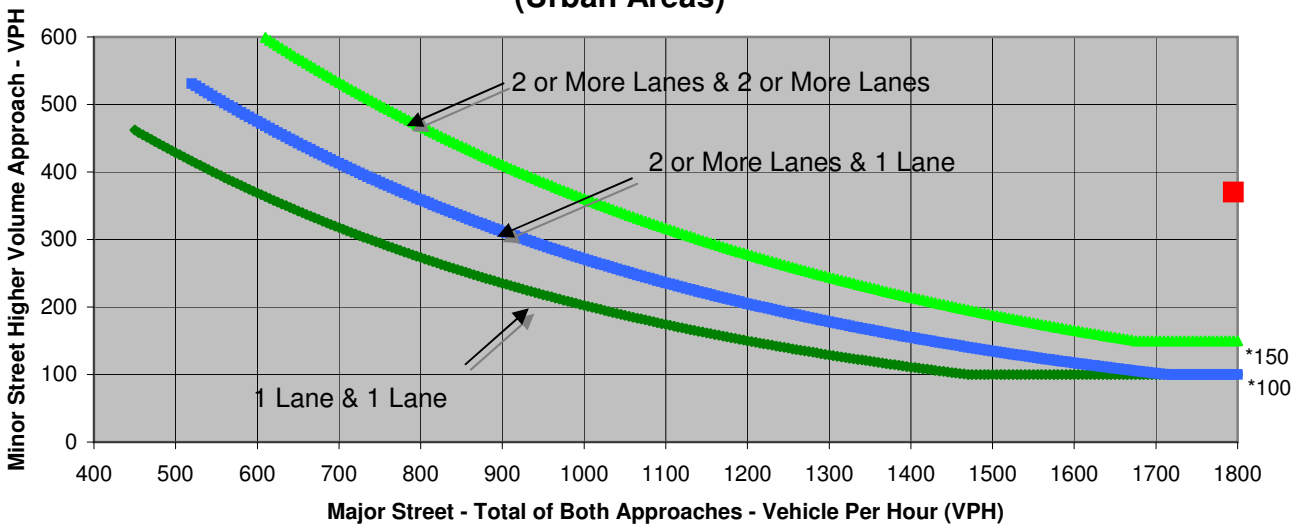
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	40	0	320
Through	715	945	0	0
Right	95	0	0	50
Total	810	985	0	370

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,795	370	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	PM

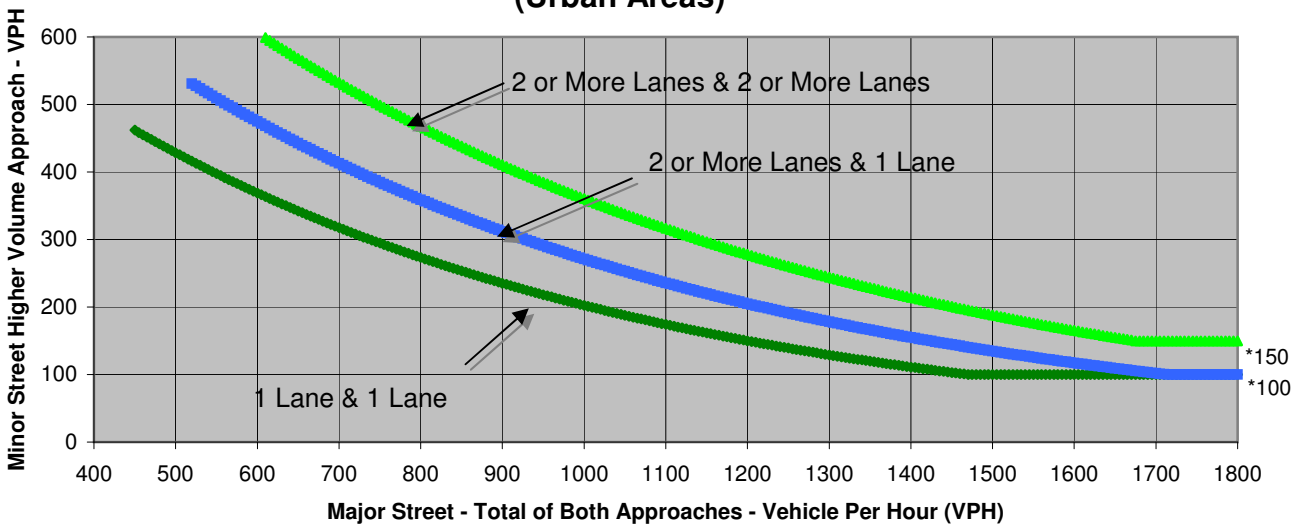
Turn Movement Volumes

	NB	SB	EB	WB
Left	20	130	200	80
Through	925	315	300	530
Right	25	690	40	510
Total	970	1,135	540	1,120

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,105	1,120	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	PM

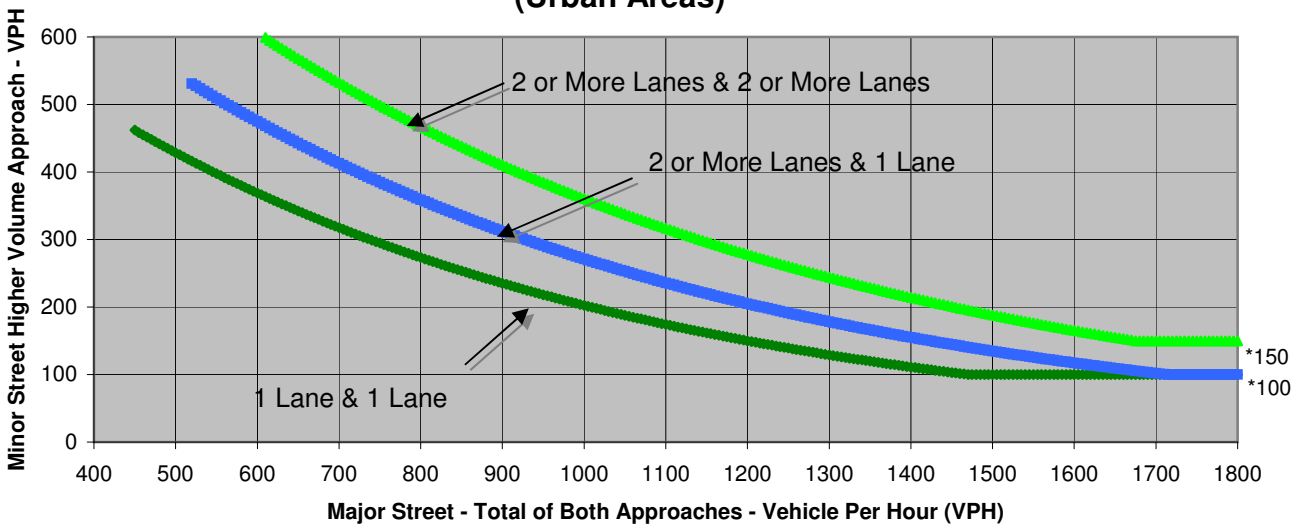
Turn Movement Volumes

	NB	SB	EB	WB
Left	110	245	380	40
Through	550	270	220	525
Right	80	145	55	600
Total	740	660	655	1,165

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	1,400	1,165	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Daniels Street
Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	PM

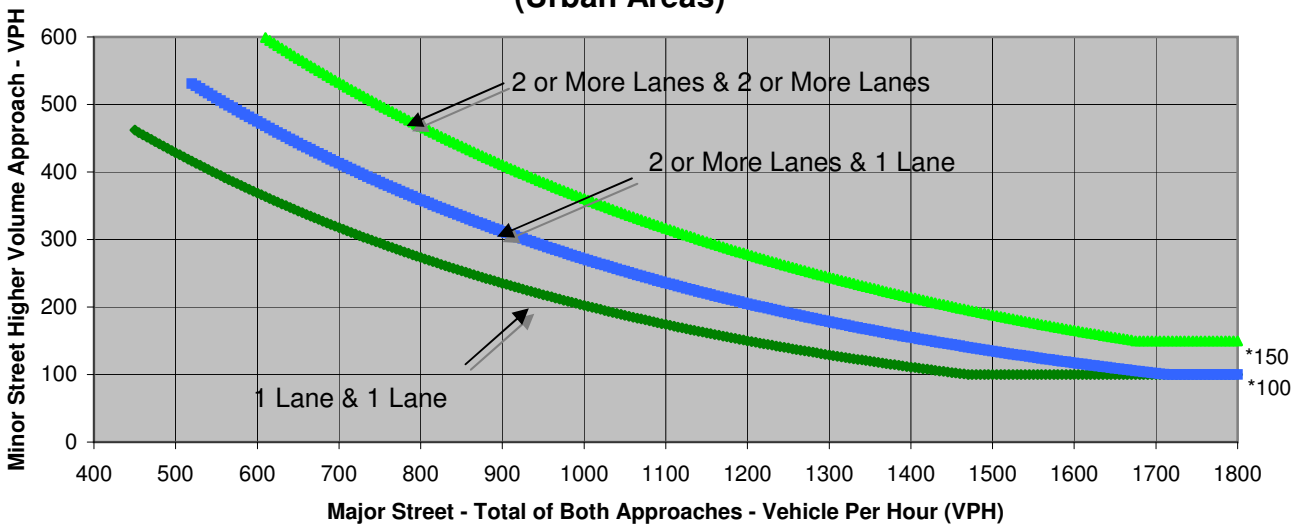
Turn Movement Volumes

	NB	SB	EB	WB
Left	90	0	40	0
Through	1,070	1,260	0	0
Right	0	30	140	0
Total	1,160	1,290	180	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Daniels Street	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,450	180	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Woodward Avenue

Project	Union Crossing
Scenario	Cumulative No Project
Peak Hour	PM

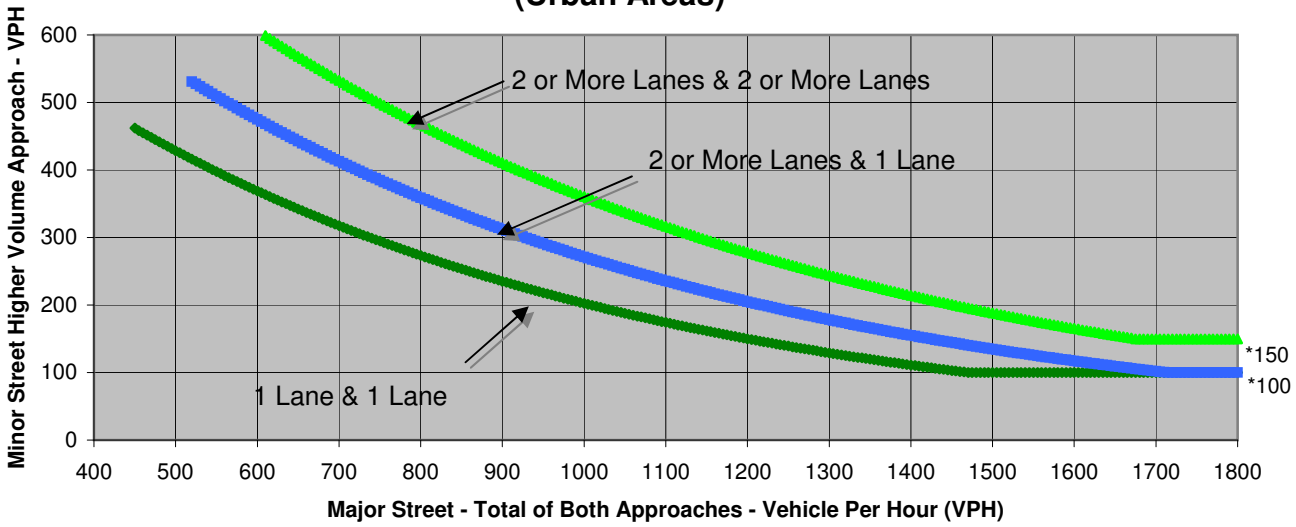
Turn Movement Volumes

	NB	SB	EB	WB
Left	250	85	165	50
Through	1,110	350	275	570
Right	40	140	70	170
Total	1,400	575	510	790

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

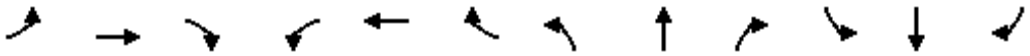


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	1,975	790	

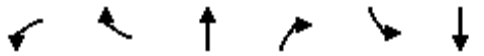
* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3357		1770	3284		1770	1827	1583	1770	1745	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3357		1770	3284		1770	1827	1583	1770	1745	
Volume (vph)	560	345	180	275	345	320	215	1175	280	270	625	320
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)	589	363	189	289	363	337	226	1237	295	284	658	337
RTOR Reduction (vph)	0	62	0	0	157	0	0	0	50	0	17	0
Lane Group Flow (vph)	589	490	0	289	543	0	226	1237	245	284	978	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	11.0	19.4		18.0	26.4		15.0	32.5	32.5	21.6	39.1	
Effective Green, g (s)	11.0	19.4		18.0	26.4		15.0	32.5	32.5	21.6	39.1	
Actuated g/C Ratio	0.10	0.18		0.17	0.25		0.14	0.30	0.30	0.20	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	181	606		296	806		247	552	479	356	635	
v/s Ratio Prot	c0.33	c0.15		c0.16	0.17		c0.13	c0.68		0.16	c0.56	
v/s Ratio Perm									0.15			
v/c Ratio	3.25	0.81		0.98	0.67		0.91	2.24	0.51	0.80	1.54	
Uniform Delay, d1	48.2	42.3		44.5	36.7		45.6	37.5	30.9	40.9	34.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1028.5	7.8		45.4	2.2		35.0	564.3	3.9	11.8	251.2	
Delay (s)	1076.8	50.1		89.9	38.9		80.7	601.8	34.8	52.6	285.4	
Level of Service	F	D		F	D		F	F	C	D	F	
Approach Delay (s)		580.1			53.8			439.6			233.7	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	345.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.71		
Actuated Cycle Length (s)	107.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	141.0%	ICU Level of Service	H
Analysis Period (min)	15		

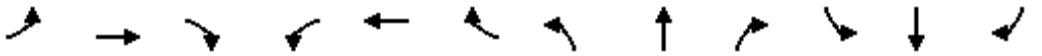
c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	110	40	1630	350	80	1000
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	116	42	1716	368	84	1053
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.57	0.57			0.57	
vC, conflicting volume	3123	1904			2086	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4724	2586			2905	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	0			0	
cM capacity (veh/h)	0	19			71	

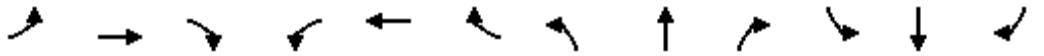
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	158	2084	1137
Volume Left	116	0	84
Volume Right	42	368	0
cSH	0	1700	71
Volume to Capacity	Err	1.23	1.18
Queue Length 95th (ft)	Err	0	162
Control Delay (s)	Err	0.0	662.0
Lane LOS	F		F
Approach Delay (s)	Err	0.0	662.0
Approach LOS	F		

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	134.2%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Volume (vph)	440	45	670	480	25	150	335	1390	370	80	900	130
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)	463	47	705	505	26	158	353	1463	389	84	947	137
RTOR Reduction (vph)	0	0	118	0	0	75	0	0	121	0	0	91
Lane Group Flow (vph)	463	47	587	505	26	83	353	1463	268	84	947	46
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.0	40.0	40.0	14.0	41.0	41.0	13.0	44.0	44.0	6.0	37.0	37.0
Effective Green, g (s)	13.0	40.0	40.0	14.0	41.0	41.0	13.0	44.0	44.0	6.0	37.0	37.0
Actuated g/C Ratio	0.11	0.33	0.33	0.12	0.34	0.34	0.11	0.37	0.37	0.05	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	372	621	521	401	637	533	372	1273	567	89	1070	481
v/s Ratio Prot	0.13	0.03		c0.15	0.01		c0.10	c0.42		0.05	0.27	
v/s Ratio Perm			c0.38			0.05			0.17			0.03
v/c Ratio	1.24	0.08	1.13	1.26	0.04	0.16	0.95	1.15	0.47	0.94	0.89	0.10
Uniform Delay, d1	53.5	27.4	40.0	53.0	26.4	27.5	53.2	38.0	29.1	56.8	39.5	29.6
Progression Factor	1.00	1.00	1.00	1.00	1.01	1.02	1.01	1.09	1.25	1.00	1.00	1.00
Incremental Delay, d2	130.8	0.1	79.1	135.3	0.0	0.1	5.8	68.1	0.3	76.4	10.7	0.4
Delay (s)	184.3	27.4	119.1	188.3	26.8	28.2	59.7	109.4	36.7	133.2	50.2	30.0
Level of Service	F	C	F	F	C	C	E	F	D	F	D	C
Approach Delay (s)		140.4			145.5			88.6			53.8	
Approach LOS		F			F			F			D	

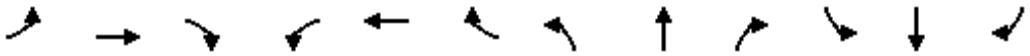
Intersection Summary			
HCM Average Control Delay	100.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1770	1495	1770	1759			1759	1495
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1770	1495	1770	1759			1759	1495
Volume (vph)	0	0	0	835	0	485	440	1610	0	0	1290	760
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	0	0	879	0	511	463	1695	0	0	1358	800
RTOR Reduction (vph)	0	0	0	0	0	20	0	0	0	0	0	194
Lane Group Flow (vph)	0	0	0	0	879	491	463	1695	0	0	1358	606
Heavy Vehicles (%)	0%	2%	2%	2%	2%	8%	2%	8%	2%	2%	8%	8%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					36.0	36.0	18.0	76.0			54.0	54.0
Effective Green, g (s)					36.0	36.0	18.0	76.0			54.0	54.0
Actuated g/C Ratio					0.30	0.30	0.15	0.63			0.45	0.45
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					531	449	266	1114			792	673
v/s Ratio Prot							c0.26	0.96			c0.77	
v/s Ratio Perm					0.50	0.33						0.41
v/c Ratio					1.66	1.09	1.74	1.52			1.71	0.90
Uniform Delay, d1					42.0	42.0	51.0	22.0			33.0	30.5
Progression Factor					1.00	1.00	1.63	1.35			0.78	0.69
Incremental Delay, d2					303.2	70.0	334.7	235.1			322.1	2.1
Delay (s)					345.2	112.0	417.8	264.9			347.7	23.1
Level of Service					F	F	F	F			F	C
Approach Delay (s)		0.0			259.5			297.7			227.3	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM Average Control Delay	261.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	167.5%	ICU Level of Service	H
Analysis Period (min)	15		

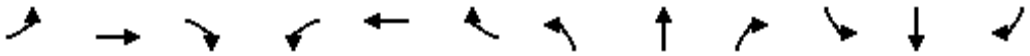
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1671	1583					1863	1583	1671	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1671	1583					1863	1583	1671	1863	
Volume (vph)	810	0	1250	0	0	0	0	1240	990	540	1585	0
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)	853	0	1316	0	0	0	0	1305	1042	568	1668	0
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	311	0	0	0
Lane Group Flow (vph)	0	853	1306	0	0	0	0	1305	731	568	1668	0
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		47.0	47.0					42.0	42.0	19.0	65.0	
Effective Green, g (s)		47.0	47.0					42.0	42.0	19.0	65.0	
Actuated g/C Ratio		0.39	0.39					0.35	0.35	0.16	0.54	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		654	620					652	554	265	1009	
v/s Ratio Prot								c0.70		c0.34	0.90	
v/s Ratio Perm		0.51	c0.83						0.46			
v/c Ratio		1.30	2.11					2.00	1.32	2.14	1.65	
Uniform Delay, d1		36.5	36.5					39.0	39.0	50.5	27.5	
Progression Factor		1.00	1.00					1.00	1.00	0.95	1.50	
Incremental Delay, d2		147.9	503.6					456.1	155.9	515.7	294.3	
Delay (s)		184.4	540.1					495.1	194.9	563.6	335.7	
Level of Service		F	F					F	F	F	F	
Approach Delay (s)		400.2			0.0			361.8			393.6	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM Average Control Delay	384.7	HCM Level of Service	F
HCM Volume to Capacity ratio	2.07		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	167.5%	ICU Level of Service	H
Analysis Period (min)	15		

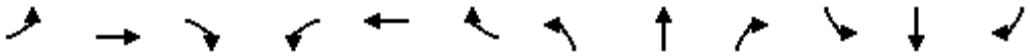
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	730	45	25	155	55	625	45	875	145	790	1485	560
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	768	47	26	163	58	658	47	921	153	832	1563	589
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											720	
pX, platoon unblocked	0.48	0.48	0.48	0.48	0.48		0.48					
vC, conflicting volume	4600	4395	1563	4279	4832	921	2153			1074		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8530	8100	2178	7858	9014	921	3411			1074		
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	0	6	0	0	0	0			0		
cM capacity (veh/h)	0	0	28	0	0	328	37			649		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	842	163	716	47	921	153	832	1563	589
Volume Left	768	163	0	47	0	0	832	0	0
Volume Right	26	0	658	0	0	153	0	0	589
cSH	0	0	0	37	1700	1700	649	1700	1700
Volume to Capacity	Err	Err	Err	1.26	0.54	0.09	1.28	0.92	0.35
Queue Length 95th (ft)	Err	Err	Err	122	0	0	810	0	0
Control Delay (s)	Err	Err	Err	401.6	0.0	0.0	158.5	0.0	0.0
Lane LOS	F	F	F	F			F		
Approach Delay (s)	Err	Err		17.0			44.2		
Approach LOS	F	F							

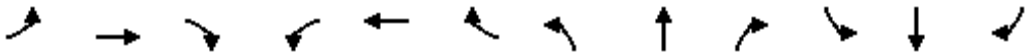
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	149.3%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	480	460	30	60	385	275	40	310	40	510	1030	125
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	505	484	32	63	405	289	42	326	42	537	1084	132

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	1021	758	411	1753
Volume Left (vph)	505	63	42	537
Volume Right (vph)	32	289	42	132
Hadj (s)	0.11	-0.18	-0.01	0.05
Departure Headway (s)	9.7	9.4	9.6	9.6
Degree Utilization, x	2.75	1.98	1.09	4.68
Capacity (veh/h)	382	389	385	380
Control Delay (s)	812.9	469.9	104.2	1681.1
Approach Delay (s)	812.9	469.9	104.2	1681.1
Approach LOS	F	F	F	F

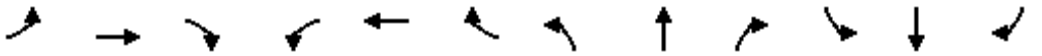
Intersection Summary			
Delay	1059.1		
HCM Level of Service	F		
Intersection Capacity Utilization	217.3%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3444		1770	3284		1770	3392	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3444		1770	3284		1770	3392	
Volume (vph)	290	520	290	185	550	120	270	605	135	130	600	230
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)	305	547	305	195	579	126	284	637	142	137	632	242
RTOR Reduction (vph)	0	0	212	0	23	0	0	24	0	0	50	0
Lane Group Flow (vph)	305	547	93	195	682	0	284	755	0	137	824	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.0	24.0	24.0	6.0	20.0		13.0	26.0		8.0	21.0	
Effective Green, g (s)	10.0	24.0	24.0	6.0	20.0		13.0	26.0		8.0	21.0	
Actuated g/C Ratio	0.12	0.30	0.30	0.08	0.25		0.16	0.32		0.10	0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	221	559	475	133	861		288	1067		177	890	
v/s Ratio Prot	c0.17	c0.29		0.11	0.20		c0.16	0.23		0.08	c0.24	
v/s Ratio Perm			0.06									
v/c Ratio	1.38	0.98	0.20	1.47	0.79		0.99	0.71		0.77	0.93	
Uniform Delay, d1	35.0	27.7	20.8	37.0	28.1		33.4	23.7		35.1	28.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	196.7	32.2	0.2	246.1	5.0		48.8	4.0		18.8	16.8	
Delay (s)	231.7	60.0	21.0	283.1	33.1		82.2	27.6		53.9	45.5	
Level of Service	F	E	C	F	C		F	C		D	D	
Approach Delay (s)		95.0			87.2			42.2			46.6	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM Average Control Delay	67.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

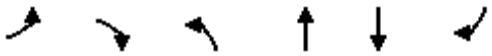
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.92		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1719		1770	1705		1770	3281		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1719		1770	1705		1770	3281		1770	1863	1583
Volume (vph)	110	100	105	115	100	130	190	920	220	160	785	110
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)	116	105	111	121	105	137	200	968	232	168	826	116
RTOR Reduction (vph)	0	62	0	0	77	0	0	28	0	0	0	80
Lane Group Flow (vph)	116	154	0	121	165	0	200	1172	0	168	826	36
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	4.6	11.2		4.6	11.2		6.1	20.6		8.0	22.5	4.6
Effective Green, g (s)	4.6	11.2		4.6	11.2		6.1	20.6		8.0	22.5	4.6
Actuated g/C Ratio	0.08	0.19		0.08	0.19		0.10	0.34		0.13	0.37	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	135	319		135	316		179	1119		234	694	121
v/s Ratio Prot	0.07	0.09		c0.07	c0.10		c0.11	0.36		0.09	c0.44	0.02
v/s Ratio Perm												
v/c Ratio	0.86	0.48		0.90	0.52		1.12	1.05		0.72	1.19	0.29
Uniform Delay, d1	27.6	22.0		27.7	22.2		27.1	19.9		25.1	18.9	26.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.5	1.2		47.2	1.6		102.2	40.3		10.1	99.5	1.4
Delay (s)	66.1	23.2		74.9	23.8		129.4	60.2		35.2	118.5	27.7
Level of Service	E	C		E	C		F	E		D	F	C
Approach Delay (s)		38.2			40.8			70.1			96.4	
Approach LOS		D			D			E			F	

Intersection Summary			
HCM Average Control Delay	72.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	60.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

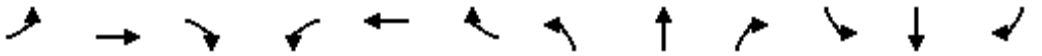
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	40	110	145	1395	1010	40
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	116	153	1468	1063	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				306		
pX, platoon unblocked	0.30					
vC, conflicting volume	2858	1084	1105			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	7227	1084	1105			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	56	76			
cM capacity (veh/h)	0	264	632			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	158	1621	1105
Volume Left	42	153	0
Volume Right	116	0	42
cSH	0	632	1700
Volume to Capacity	Err	0.24	0.65
Queue Length 95th (ft)	Err	24	0
Control Delay (s)	Err	21.3	0.0
Lane LOS	F	C	
Approach Delay (s)	Err	21.3	0.0
Approach LOS	F		

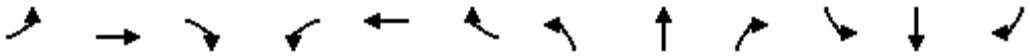
Intersection Summary			
Average Delay	559.3		
Intersection Capacity Utilization	156.0%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1671	1583	1770	1759			1863	1583
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1671	1583	1770	1759			1863	1583
Volume (vph)	0	0	0	155	0	440	410	1100	0	0	810	310
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	0	0	163	0	463	432	1158	0	0	853	326
RTOR Reduction (vph)	0	0	0	0	0	102	0	0	0	0	0	126
Lane Group Flow (vph)	0	0	0	0	163	361	432	1158	0	0	853	200
Heavy Vehicles (%)	2%	2%	2%	8%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					26.0	26.0	28.0	86.0			54.0	54.0
Effective Green, g (s)					26.0	26.0	28.0	86.0			54.0	54.0
Actuated g/C Ratio					0.22	0.22	0.23	0.72			0.45	0.45
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					362	343	413	1261			838	712
v/s Ratio Prot							c0.24	0.66			c0.46	
v/s Ratio Perm					0.10	c0.23						0.13
v/c Ratio					0.45	1.05	1.05	0.92			1.02	0.28
Uniform Delay, d1					40.8	47.0	46.0	14.1			33.0	20.8
Progression Factor					1.00	1.00	0.46	0.26			1.00	1.00
Incremental Delay, d2					0.9	63.2	27.4	1.4			35.7	1.0
Delay (s)					41.7	110.2	48.5	5.1			68.7	21.8
Level of Service					D	F	D	A			E	C
Approach Delay (s)		0.0			92.4			16.9			55.7	
Approach LOS		A			F			B			E	

Intersection Summary			
HCM Average Control Delay	44.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1495					1759	1495	1770	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1495					1759	1495	1770	1863	
Volume (vph)	610	0	900	0	0	0	0	900	90	300	665	0
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)	642	0	947	0	0	0	0	947	95	316	700	0
RTOR Reduction (vph)	0	0	137	0	0	0	0	0	33	0	0	0
Lane Group Flow (vph)	0	642	810	0	0	0	0	947	62	316	700	0
Heavy Vehicles (%)	2%	2%	8%	2%	2%	2%	2%	8%	8%	2%	2%	8%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		44.0	44.0					48.0	48.0	16.0	68.0	
Effective Green, g (s)		44.0	44.0					48.0	48.0	16.0	68.0	
Actuated g/C Ratio		0.37	0.37					0.40	0.40	0.13	0.57	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		649	548					704	598	236	1056	
v/s Ratio Prot								c0.54		c0.18	0.38	
v/s Ratio Perm		0.36	c0.54						0.04			
v/c Ratio		0.99	1.48					1.35	0.10	1.34	0.66	
Uniform Delay, d1		37.8	38.0					36.0	22.5	52.0	18.0	
Progression Factor		1.00	1.00					1.00	1.00	1.07	0.13	
Incremental Delay, d2		32.2	224.5					164.7	0.3	155.2	1.4	
Delay (s)		70.0	262.5					200.7	22.9	210.8	3.8	
Level of Service		E	F					F	C	F	A	
Approach Delay (s)		184.7			0.0			184.5			68.2	
Approach LOS		F			A			F			E	

Intersection Summary			
HCM Average Control Delay	152.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

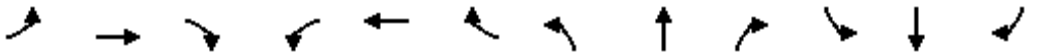
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.88	0.95	0.88	0.97	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	2787	3539	2787	3433	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	2787	3539	2787	3433	3539
Volume (vph)	290	520	470	130	475	1090
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	305	547	495	137	500	1147
RTOR Reduction (vph)	0	465	0	62	0	0
Lane Group Flow (vph)	305	82	495	75	500	1147
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	15.8	15.8	58.4	58.4	19.8	82.2
Effective Green, g (s)	15.8	15.8	58.4	58.4	19.8	82.2
Actuated g/C Ratio	0.15	0.15	0.55	0.55	0.19	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	512	415	1950	1535	641	2744
v/s Ratio Prot	c0.09		0.14		c0.15	c0.32
v/s Ratio Perm		0.03		0.03		
v/c Ratio	0.60	0.20	0.25	0.05	0.78	0.42
Uniform Delay, d1	42.1	39.5	12.4	11.0	41.0	4.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	0.2	0.3	0.1	6.1	0.5
Delay (s)	44.0	39.8	12.7	11.0	47.1	4.4
Level of Service	D	D	B	B	D	A
Approach Delay (s)	41.3		12.4			17.4
Approach LOS	D		B			B

Intersection Summary			
HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection has too many lanes per leg.

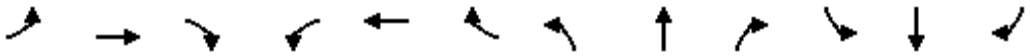
HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.



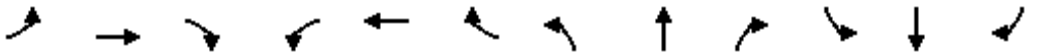
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1488
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1488
Volume (vph)	0	0	0	740	0	350	380	1465	0	0	740	760
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	0	0	779	0	368	400	1542	0	0	779	800
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	339
Lane Group Flow (vph)	0	0	0	0	779	368	400	1542	0	0	779	461
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					44.0	120.0	16.0	68.0			48.0	48.0
Effective Green, g (s)					44.0	120.0	16.0	68.0			48.0	48.0
Actuated g/C Ratio					0.37	1.00	0.13	0.57			0.40	0.40
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					637	1492	231	1015			717	595
v/s Ratio Prot					c0.45		c0.23	c0.86			0.43	
v/s Ratio Perm						0.25						0.31
v/c Ratio					1.22	0.25	1.73	1.52			1.09	0.77
Uniform Delay, d1					38.0	0.0	52.0	26.0			36.0	31.3
Progression Factor					1.00	1.00	0.36	0.31			1.00	1.00
Incremental Delay, d2					114.0	0.4	330.9	234.1			59.5	9.5
Delay (s)					152.0	0.4	349.6	242.2			95.5	40.8
Level of Service					F	A	F	F			F	D
Approach Delay (s)		0.0			103.3			264.3			67.8	
Approach LOS		A			F			F			E	

Intersection Summary			
HCM Average Control Delay	158.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	150.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.95		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1518					1729		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1518					1729		1703	1827	
Volume (vph)	1055	0	950	0	0	0	0	790	400	290	1190	0
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)	1111	0	1000	0	0	0	0	832	421	305	1253	0
RTOR Reduction (vph)	0	0	33	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	1111	967	0	0	0	0	1238	0	305	1253	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		45.0	45.0					50.0		13.0	67.0	
Effective Green, g (s)		45.0	45.0					50.0		13.0	67.0	
Actuated g/C Ratio		0.38	0.38					0.42		0.11	0.56	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		639	569					720		184	1020	
v/s Ratio Prot		c0.65						c0.72		c0.18	0.69	
v/s Ratio Perm			0.64									
v/c Ratio		1.74	1.70					1.72		1.66	1.23	
Uniform Delay, d1		37.5	37.5					35.0		53.5	26.5	
Progression Factor		1.00	1.00					1.00		1.46	1.19	
Incremental Delay, d2		338.9	322.2					329.5		298.1	103.6	
Delay (s)		376.4	359.7					364.5		376.2	135.3	
Level of Service		F	F					F		F	F	
Approach Delay (s)		368.5			0.0			364.5			182.5	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM Average Control Delay	308.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	150.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	560	0	280	0	0	0	170	630	0	0	1660	480
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	589	0	295	0	0	0	179	663	0	0	1747	505
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked	0.45	0.45	0.45	0.45	0.45		0.45					
vC, conflicting volume	2768	2768	1747	3063	3274	663	2253			663		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4895	4895	2646	5544	6008	663	3759			663		
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	0	0	0	0	100	0			100		
cM capacity (veh/h)	0	0	14	0	0	461	26			926		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	589	295	0	179	663	1747	505
Volume Left	589	0	0	179	0	0	0
Volume Right	0	295	0	0	0	0	505
cSH	0	14	1700	26	1700	1700	1700
Volume to Capacity	Err	21.66	0.00	6.98	0.39	1.03	0.30
Queue Length 95th (ft)	Err	Err	0	Err	0	0	0
Control Delay (s)	Err	Err	0.0	2991.1	0.0	0.0	0.0
Lane LOS	F	F	A	F			
Approach Delay (s)	Err		0.0	635.6		0.0	
Approach LOS	F		A				

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	137.8%	ICU Level of Service	H	
Analysis Period (min)	15			

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec):	100	Critical Vol./Cap.(X):	2.858
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	322.8
Optimal Cycle:	0	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	110	350	20	205	905	265	145	440	260	20	340	105
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	110	350	20	205	905	265	145	440	260	20	340	105
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	110	350	20	205	905	265	145	440	260	20	340	105
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	110	350	20	205	905	265	145	440	260	20	340	105
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	350	20	205	905	265	145	440	260	20	340	105
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	110	350	20	205	905	265	145	440	260	20	340	105
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	281	295	309	302	317	337	297	312	331	280	294	309
Capacity Analysis Module:												
Vol/Sat:	0.39	1.19	0.06	0.68	2.86	0.79	0.49	1.41	0.78	0.07	1.16	0.34
Crit Moves:		****			****			****			****	
Delay/Veh:	23.2	147	15.0	36.0	865	43.0	25.5	232	43.3	16.4	136	19.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	23.2	147	15.0	36.0	865	43.0	25.5	232	43.3	16.4	136	19.9
LOS by Move:	C	F	B	E	F	E	D	F	E	C	F	C
ApproachDel:	113.4			582.9			138.5			104.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	113.4			582.9			138.5			104.9		
LOS by Appr:	F			F			F			F		
AllWayAvgQ:	0.6	10.8	0.1	1.8	74.8	2.8	0.9	18.8	2.7	0.1	9.9	0.5

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

****

Intersection #14

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0000			0.0000			0.0000			0.0000		
P[C5]:	1.0000			1.0000			1.0000			1.0000		
Padj[C1]:	0.04000			0.04000			0.04000			0.04000		
Padj[C2]:	0.03000			0.03000			0.03000			0.03000		
Padj[C3]:	0.02000			0.02000			0.02000			0.02000		
Padj[C4]:	0.01000			0.01000			0.01000			0.01000		
Padj[C5]:	-0.10000			-0.10000			-0.10000			-0.10000		
Lanes:	L1		L2	L1		L2	L1		L2	L1		L2
LaneType:	LEFT		RITE	LEFT		RITE	LEFT		RITE	LEFT		RITE
HeadwayAdj:	0.500		-0.700	0.500		-0.700	0.500		-0.700	0.500		-0.700
Volume:	110		20	205		265	145		260	20		105
Capacity:	281		309	302		337	297		331	280		309
DegOfUtil:	0.39		0.06	0.67		0.78	0.48		0.78	0.07		0.34
DepHeadway:	12.69		11.49	11.85		10.65	12.03		10.83	12.72		11.52
ServiceTime:	10.4		9.2	9.5		8.3	9.7		8.5	10.4		9.2
Delay:	23.2		15.0	36.0		43.0	25.5		43.3	16.4		19.9
Queue:	0.6		0.1	1.8		2.8	0.9		2.7	0.1		0.5
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	350			905			440			340		
Capacity:	295			317			312			294		
DegOfUtil:	1.19			2.85			1.41			1.15		
DepHeadway:	12.19			11.35			11.53			12.22		
ServiceTime:	9.9			9.0			9.2			9.9		
Delay:	147.3			864.9			231.9			136.3		
Queue:	10.8			74.8			18.8			9.9		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	113.4			582.9			138.5			104.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	113.4			582.9			138.5			104.9		
LOS by Appr:	F			F			F			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	322.8
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	110	350	20	205	905	265	145	440	260	20	340	105

Major Street Volume: 1855
Minor Approach Volume: 845
Minor Approach Volume Threshold: 108 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec):	100	Critical Vol./Cap.(X):	3.149
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	404.0
Optimal Cycle:	0	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	50	310	80	920	630	390	150	410	95	100	290	340
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	50	310	80	920	630	390	150	410	95	100	290	340
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	50	310	80	920	630	390	150	410	95	100	290	340
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	50	310	80	920	630	390	150	410	95	100	290	340
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	50	310	80	920	630	390	150	410	95	100	290	340
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	50	310	80	920	630	390	150	410	95	100	290	340
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	272	283	300	292	305	324	272	283	300	280	291	308
Capacity Analysis Module:												
Vol/Sat:	0.18	1.10	0.27	3.15	2.07	1.20	0.55	1.45	0.32	0.36	1.00	1.10
Crit Moves:		****		****				****				****
Delay/Veh:	18.9	119	19.0	999.7	517	150.2	31.0	252	20.2	22.6	88.8	116.8
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	18.9	119	19.0	999.7	517	150.2	31.0	252	20.2	22.6	88.8	116.8
LOS by Move:	C	F	C	F	F	F	D	F	C	C	F	F
ApproachDel:	89.3			672.3			167.9			92.8		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	89.3			672.3			167.9			92.8		
LOS by Appr:	F			F			F			F		
AllWayAvgQ:	0.2	8.1	0.4	79.9	42.5	12.3	1.1	18.6	0.5	0.5	6.0	8.8

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

****

Intersection #18

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0000			0.0000			0.0000			0.0000		
P[C5]:	1.0000			1.0000			1.0000			1.0000		
Padj[C1]:	0.04000			0.04000			0.04000			0.04000		
Padj[C2]:	0.03000			0.03000			0.03000			0.03000		
Padj[C3]:	0.02000			0.02000			0.02000			0.02000		
Padj[C4]:	0.01000			0.01000			0.01000			0.01000		
Padj[C5]:	-0.10000			-0.10000			-0.10000			-0.10000		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	50	80		920	390		150	95		100	340	
Capacity:	272	300		292	324		272	300		280	308	
DegOfUtil:	0.18	0.27		3.15	1.20		0.55	0.32		0.36	1.10	
DepHeadway:	13.22	12.02		12.32	11.12		13.22	12.02		12.87	11.67	
ServiceTime:	10.9	9.7		10.0	8.8		10.9	9.7		10.6	9.4	
Delay:	18.9	19.0		999.7	150.2		31.0	20.2		22.6	116.8	
Queue:	0.2	0.4		79.9	12.3		1.1	0.5		0.5	8.8	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	310			630			410			290		
Capacity:	283			305			283			291		
DegOfUtil:	1.10			2.07			1.45			1.00		
DepHeadway:	12.72			11.82			12.72			12.37		
ServiceTime:	10.4			9.5			10.4			10.1		
Delay:	118.8			517.3			252.2			88.8		
Queue:	8.1			42.5			18.6			6.0		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	89.3			672.3			167.9			92.8		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	89.3			672.3			167.9			92.8		
LOS by Appr:	F			F			F			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	404.0
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	50	310	80	920	630	390	150	410	95	100	290	340

Major Street Volume: 2380
Minor Approach Volume: 730
Minor Approach Volume Threshold: 1 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Cumulative Plus Project AM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4785	veh/h
Peak-hour factor, PHF	0.97	
Peak 15-min volume, v15	1233	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1759	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1759	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.2	mi/h
Number of lanes, N	3	
Density, D	27.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Aiport
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3548	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	964	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1350	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1350	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	20.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3906	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1061	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1486	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1486	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	22.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3813	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1036	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1451	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1451	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	22.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	3459	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	940	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1316	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1316	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	20.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5043	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1370	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1919	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1919	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.7	mi/h
Number of lanes, N	3	
Density, D	30.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5973	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1623	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2272	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2272	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	54.9	mi/h
Number of lanes, N	3	
Density, D	41.4	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6858	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1864	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2609	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2609	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7068	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1921	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2689	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2689	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6907	veh/h
Peak-hour factor, PHF	0.93	
Peak 15-min volume, v15	1857	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2599	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2599	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7067	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1963	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2801	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2801	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to Lathrop
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4280	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1189	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2544	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2544	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Lathrop to Yosemite
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4115	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1143	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2446	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2446	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5742	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1595	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2276	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2276	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	54.8	mi/h
Number of lanes, N	3	
Density, D	41.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: AM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5649	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1569	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2239	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2239	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.9	mi/h
Number of lanes, N	3	
Density, D	40.0	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3548	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	740	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3548	740		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	964	231		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4049	948		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.615 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 2856$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4049	7050	No
$v_{FO} = v - v_R$	3101	7050	No
v_R	948	2000	No
$v_{3 \text{ or } av34}$	1193 pc/h	(Equation 25-15 or 25-16)	

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$? No

If yes, v_{12A} = (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 27.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.513

Space mean speed in ramp influence area, S_R = 53.2 mph

Space mean speed in outer lanes, S_0 = 70.6 mph

Space mean speed for all vehicles, S = 57.4 mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2808	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1098	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2808	1098		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	763	298		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3205	1223		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 1896$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4428	7050	No

$v_{3 \text{ or } av34} = v_{FO} = 1309$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1896	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.1$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.374$

Space mean speed in ramp influence area, $S_R = 56.4$ mph

Space mean speed in outer lanes, $S_0 = 62.1$ mph

Space mean speed for all vehicles, $S = 58.0$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3906	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	622	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3906	622		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	1061	194		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4458	797		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.612 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3037$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4458	7050	No
$v_{FO} = v - v_R$	3661	7050	No
v_R	797	2000	No

$v_{3 \text{ or } av34} = v_R$ 1421 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3037	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 29.0$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.500$

Space mean speed in ramp influence area, $S_R = 53.5$ mph

Space mean speed in outer lanes, $S_0 = 69.7$ mph

Space mean speed for all vehicles, $S = 57.8$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3284	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	529	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3284	529		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	892	144		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3748	589		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 2217 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v FO	4337	7050	No

v v 1531 pc/h (Equation 25-4 or 25-5)
3 or av34

Is v v > 2700 pc/h? No
3 or av34

Is v v > 1.5 v /2 No
3 or av34 12

If yes, v = (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v 12	2217	4400	No !

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 24.0 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence C

_____Speed Estimation_____

Intermediate speed variable, M = 0.351
S
Space mean speed in ramp influence area, S = 56.9 mph
R
Space mean speed in outer lanes, S = 61.3 mph
0
Space mean speed for all vehicles, S = 58.4 mph

_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5973	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	603	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5973	603		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1623	159		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6817	651		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.560 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 4102$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6817	7050	No
$v_{FO} = v - v_R$	6166	7050	No
v_R	651	2000	No
$v_{3 \text{ or } av34}$	2715 pc/h	(Equation 25-15 or 25-16)	

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 4117$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4117	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 38.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, $D_S = 0.487$

Space mean speed in ramp influence area, $S_R = 53.8$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 57.6$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5370	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1488	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5370	1488		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1459	404		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6129	1658		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 3625 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	7787	7050	Yes
FO			

v v 2504 pc/h (Equation 25-4 or 25-5)
3 or av34
Is v v > 2700 pc/h? No
3 or av34
Is v v > 1.5 v /2 No
3 or av34 12
If yes, v = (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	3625	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 42.8 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence F

_____Speed Estimation_____

Intermediate speed variable, M = 1.054
S
Space mean speed in ramp influence area, S = 40.8 mph
R
Space mean speed in outer lanes, S = 57.2 mph
0
Space mean speed for all vehicles, S = 44.9 mph
_____

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6858	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1620	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6858	1620		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1864	426		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7827	1748		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.484 Using Equation 5

FD
$v_{12} = v_R + (v_F - v_R) P_{FD} = 4690$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7827	7050	Yes
$v_{FO} = v_F - v_R$	6079	7050	No
v_R	1748	2000	No

$v_{3 \text{ or } av34} = v_R$ 3137 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 5127$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5127	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 47.0$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $D_S = 0.585$

Space mean speed in ramp influence area, $S_R = 51.5$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 55.4$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: AM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5238	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1830	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5238	1830		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1423	497		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	5978	2039		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
v = v (P) = 3536 pc/h
12 F FM

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v	8017	7050	Yes
FO			

v v 2442 pc/h (Equation 25-4 or 25-5)
3 or av34
Is v v > 2700 pc/h? No
3 or av34
Is v v > 1.5 v /2 No
3 or av34 12
If yes, v = (Equation 25-8)
12A

_____Flow Entering Merge Influence Area_____

	Actual	Max Desirable	Violation?
v	3536	4400	No
12			!

_____Level of Service Determination (if not F)_____

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 44.9 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence F

_____Speed Estimation_____

Intermediate speed variable, M = 1.315
S
Space mean speed in ramp influence area, S = 34.8 mph
R
Space mean speed in outer lanes, S = 57.6 mph
0
Space mean speed for all vehicles, S = 39.5 mph
_____

Leisch Method for Weaving Analysis

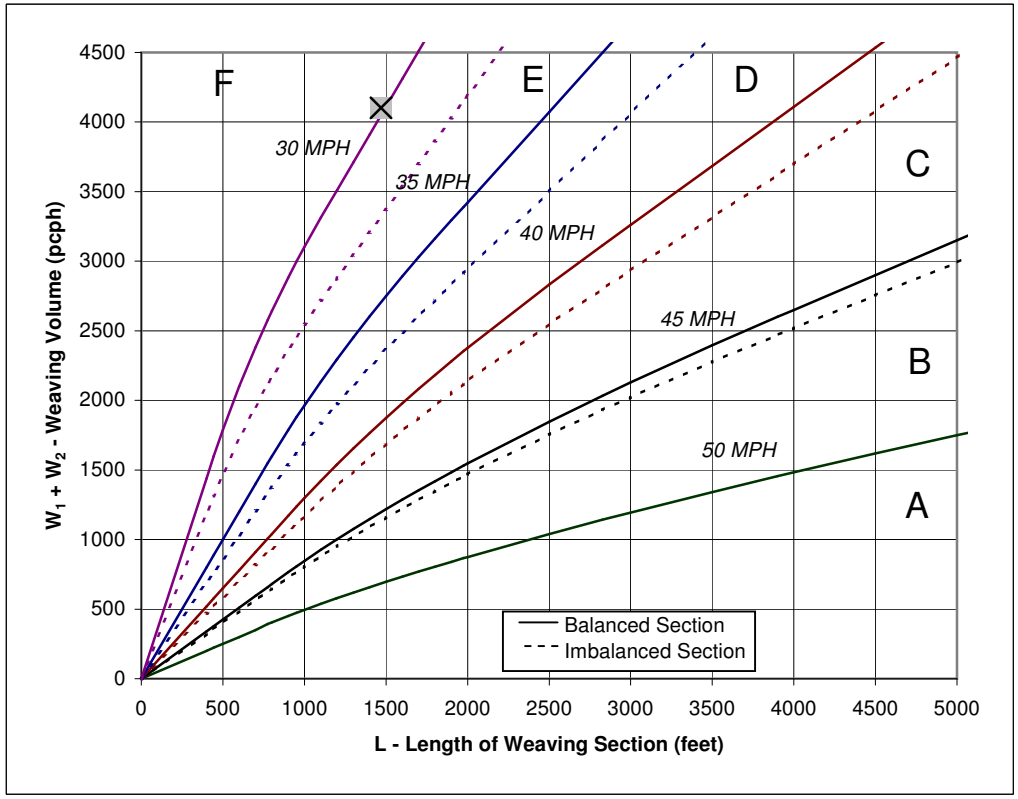
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

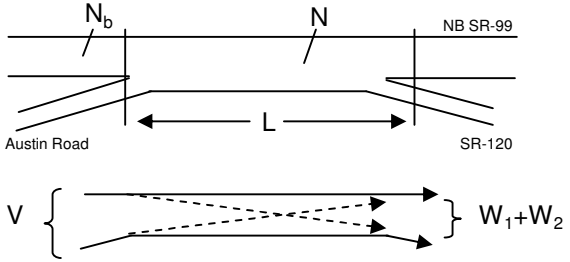
Project Information

Project	Union Commercial
Scenario	CUMULATIVE + PROJECT - AM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,351	Volume (vph)*	96	Volume (vph)*	1,892
Truck Percentage	14%	Truck Percentage	6%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	6,331	Volume (pcph)	479	Volume (pcph)	3,623



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **26.9**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,822**
6. Level of Service (LOS) **E**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

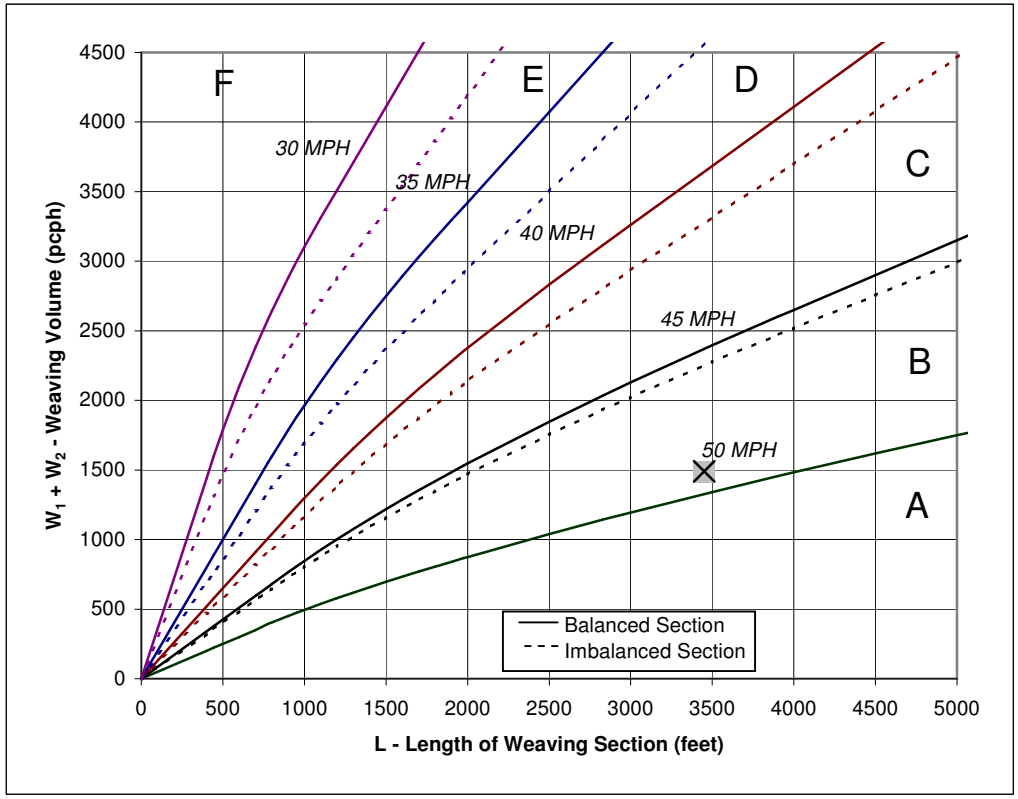
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

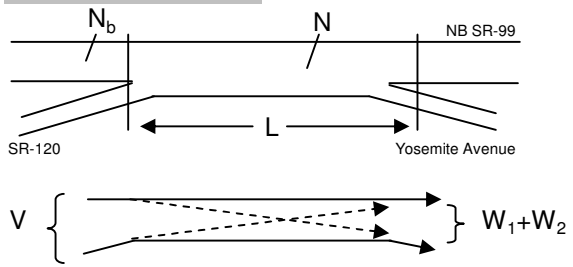
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,009	Volume (vph)*	275	Volume (vph)*	357
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,706	Volume (pcph)	838	Volume (pcph)	651

Project Information

Project	Union Commercial
Scenario	CUMULATIVE + PROJECT - AM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **49.2**
4. Weaving Intensity Factor (k) **1.32**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,305**
6. Level of Service (LOS) **D**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

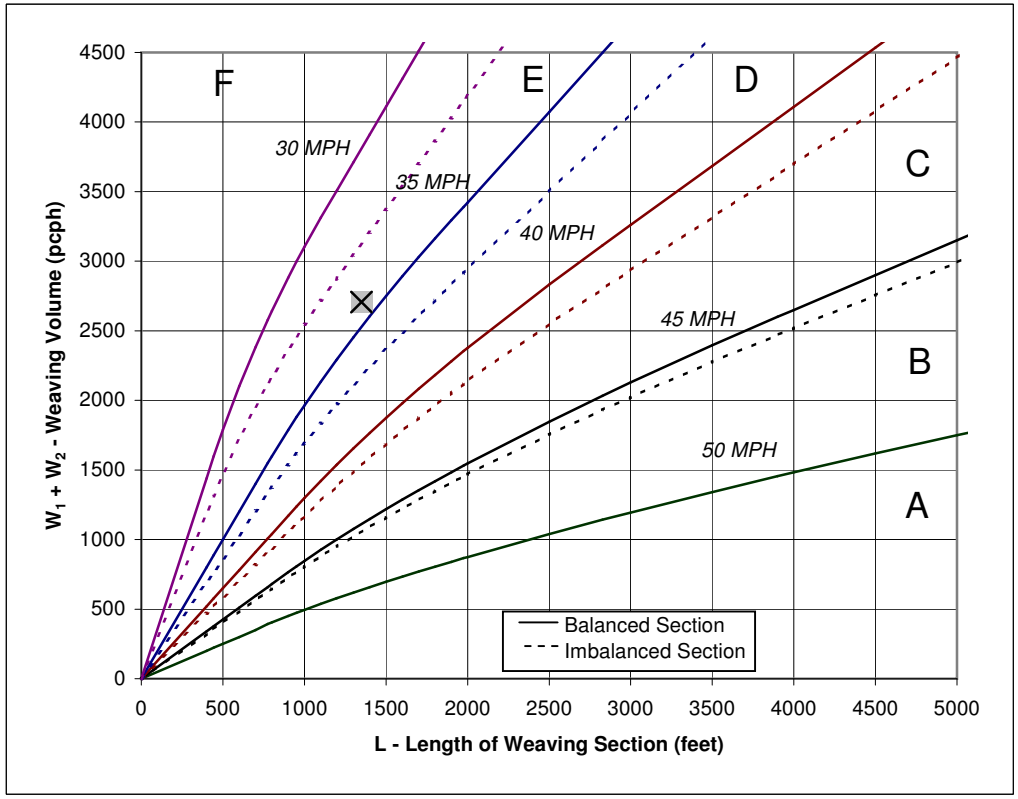
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

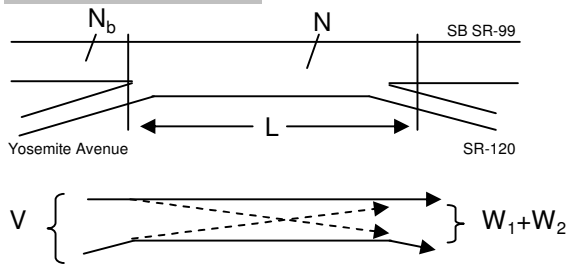
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,235	Volume (vph)*	796	Volume (vph)*	550
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	4,700	Volume (pcph)	1,286	Volume (pcph)	1,420

Project Information

Project	Union Commercial
Scenario	CUMULATIVE + PROJECT - AM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **27.9**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,424**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Project Access #19
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

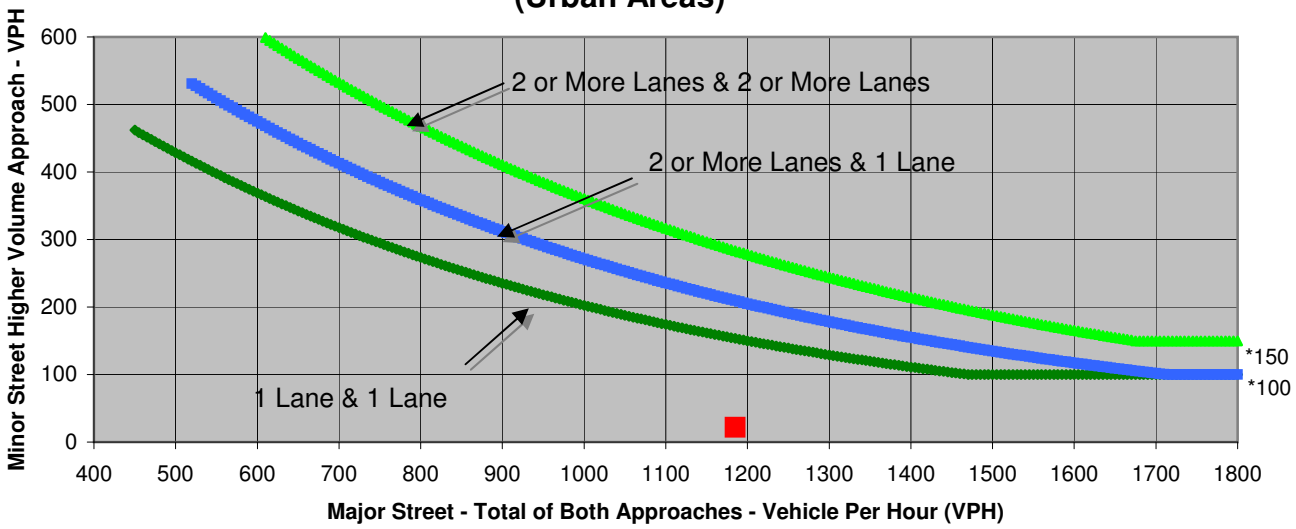
Turn Movement Volumes

	NB	SB	EB	WB
Left		0	0	0
Through		1,128	0	0
Right		57	22	0
Total	0	1,185	22	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Project Access #19	
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	1,185	22	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Project Access
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

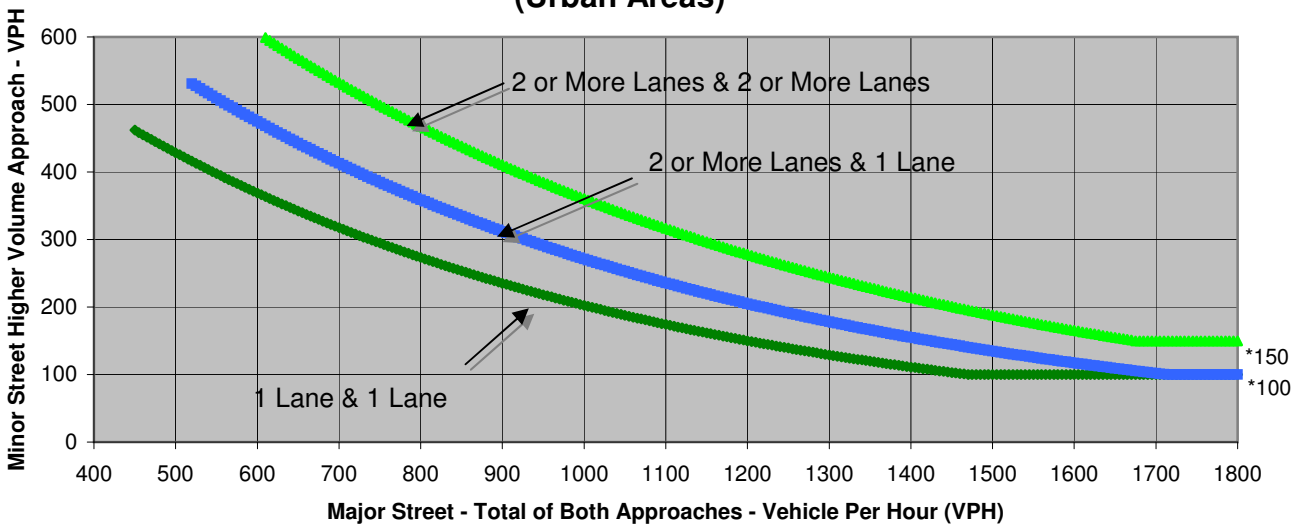
Turn Movement Volumes

	NB	SB	EB	WB
Left	27	0	16	0
Through	1,503	633	0	0
Right	0	16	5	0
Total	1,530	649	21	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Project Access	Warrant Met
Number of Approach Lanes	2	1	NO
Traffic Volume (VPH) *	2,179	21	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Atherton Drive
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

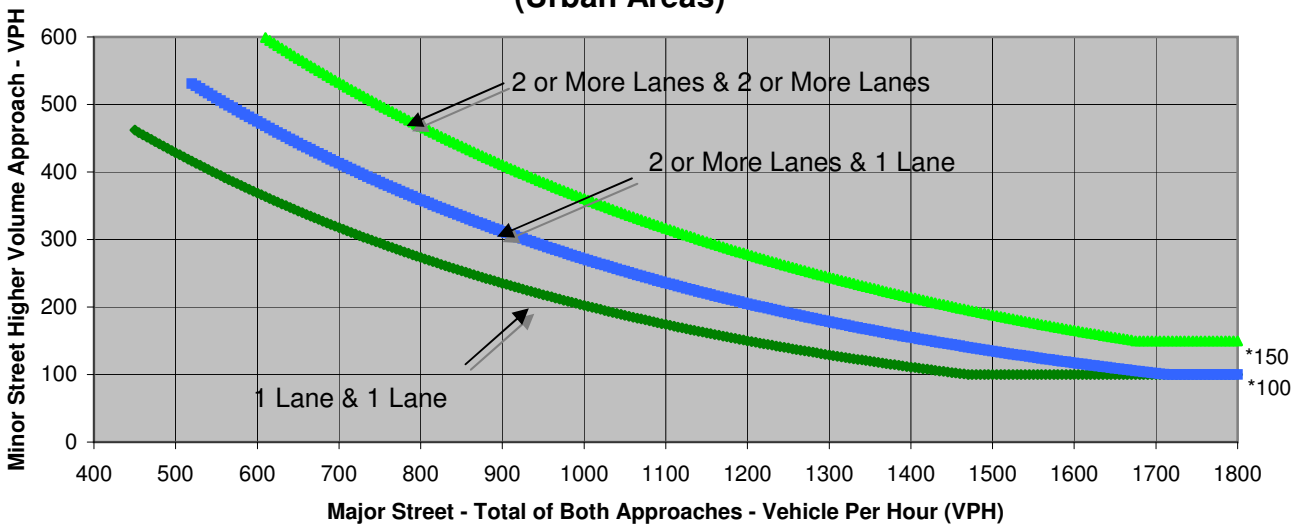
Turn Movement Volumes

	NB	SB	EB	WB
Left	43	370	127	470
Through	1,415	995	35	40
Right	181	675	670	20
Total	1,639	2,040	832	530

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Atherton Drive	
Number of Approach Lanes	3	3	YES
Traffic Volume (VPH) *	3,679	832	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Wawona Street
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

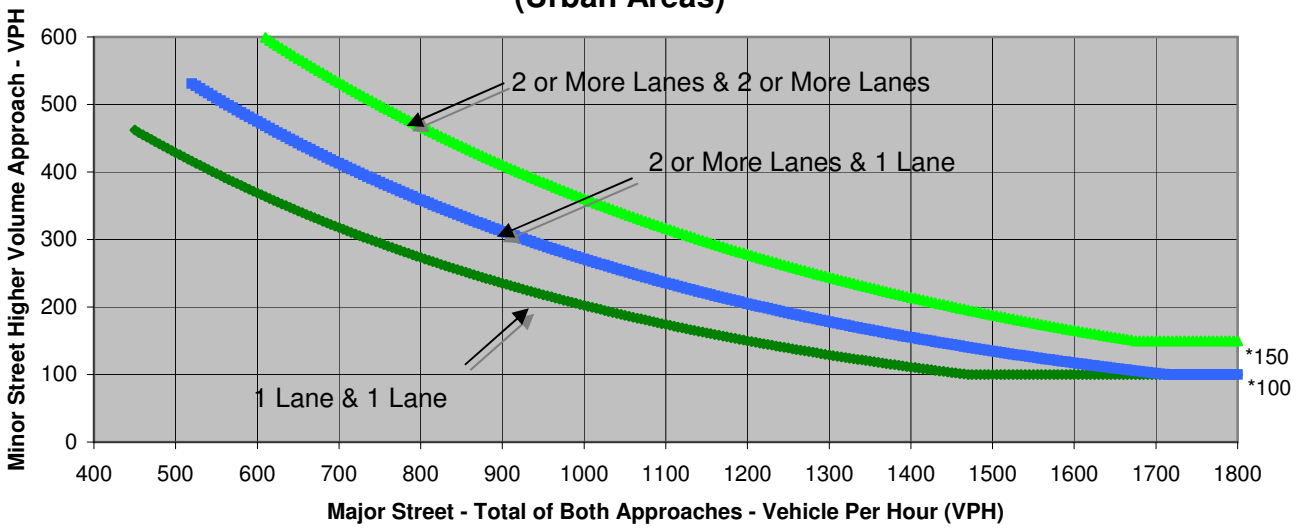
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	40	0	320
Through	719	952	0	0
Right	95	0	0	50
Total	814	992	0	370

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,806	370	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

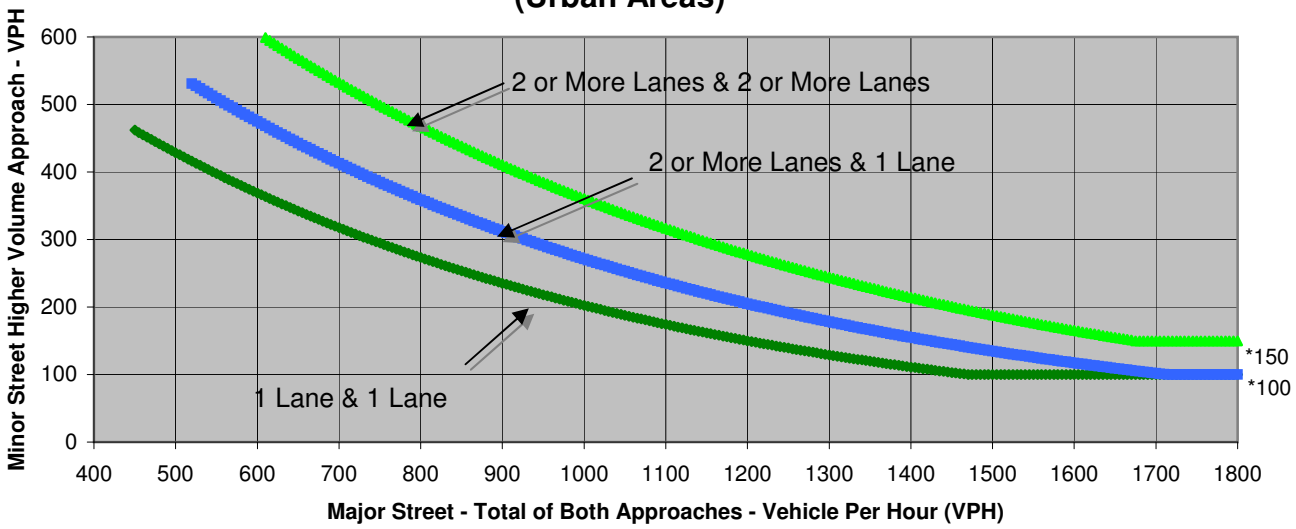
Turn Movement Volumes

	NB	SB	EB	WB
Left	20	137	200	83
Through	925	315	311	537
Right	30	690	40	514
Total	975	1,142	551	1,134

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,117	1,134	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Atherton Drive

Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

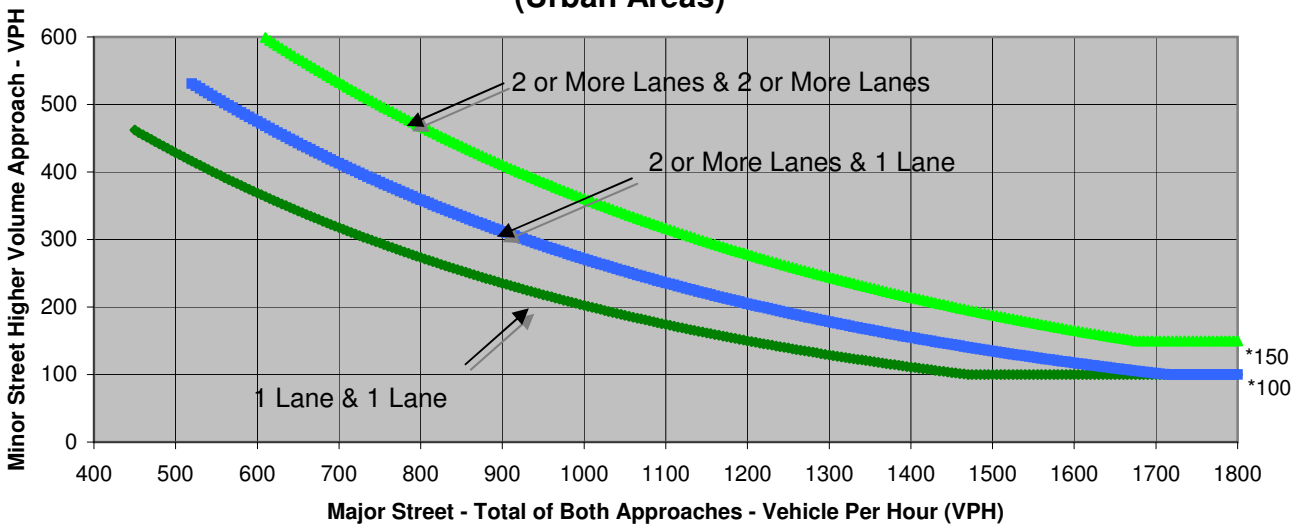
Turn Movement Volumes

	NB	SB	EB	WB
Left	250	0	120	
Through	1,280	590	0	
Right	0	370	70	
Total	1,530	960	190	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Main Street	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	2,490	190	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

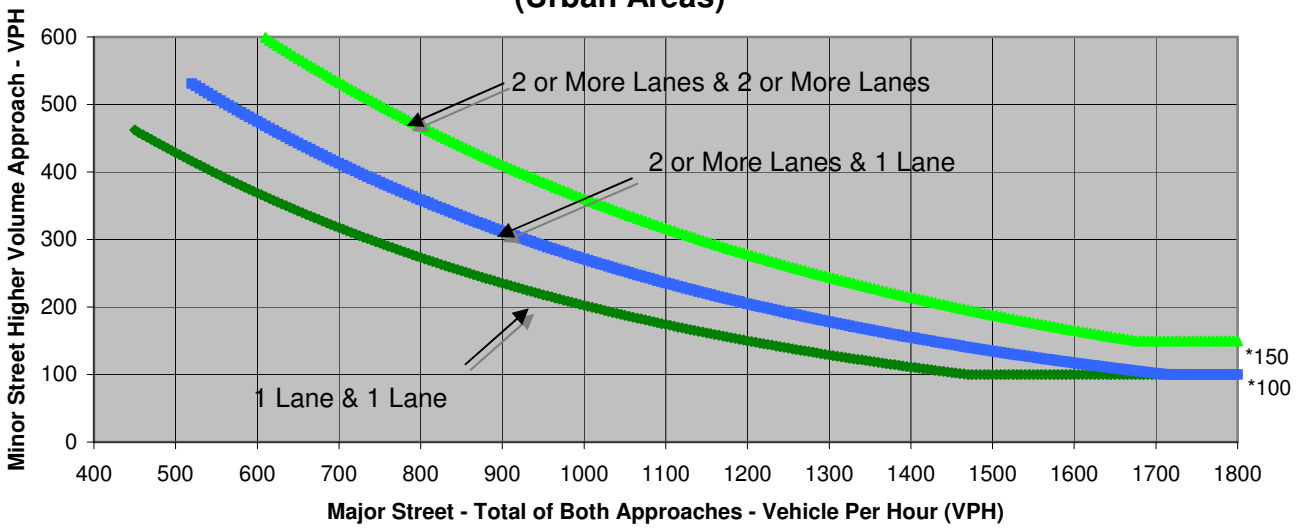
Turn Movement Volumes

	NB	SB	EB	WB
Left	121	245	380	40
Through	550	270	224	532
Right	80	145	62	600
Total	751	660	666	1,172

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	1,411	1,172	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Daniels Street
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

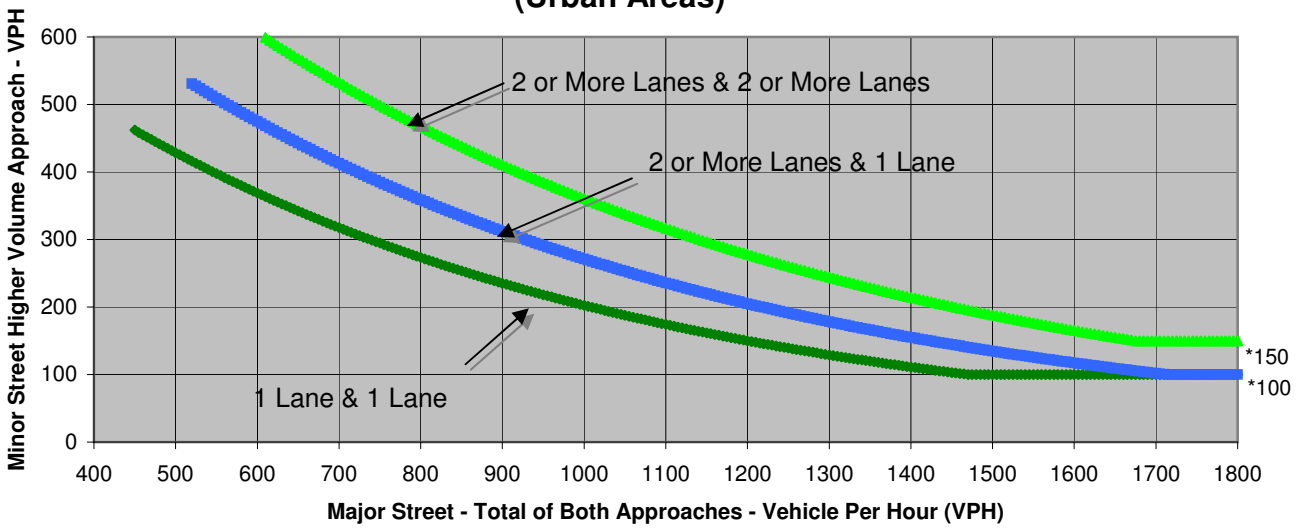
Turn Movement Volumes

	NB	SB	EB	WB
Left	97	0	40	0
Through	1,104	1,313	0	0
Right	0	30	150	0
Total	1,201	1,343	190	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Daniels Street	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,544	190	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	AM

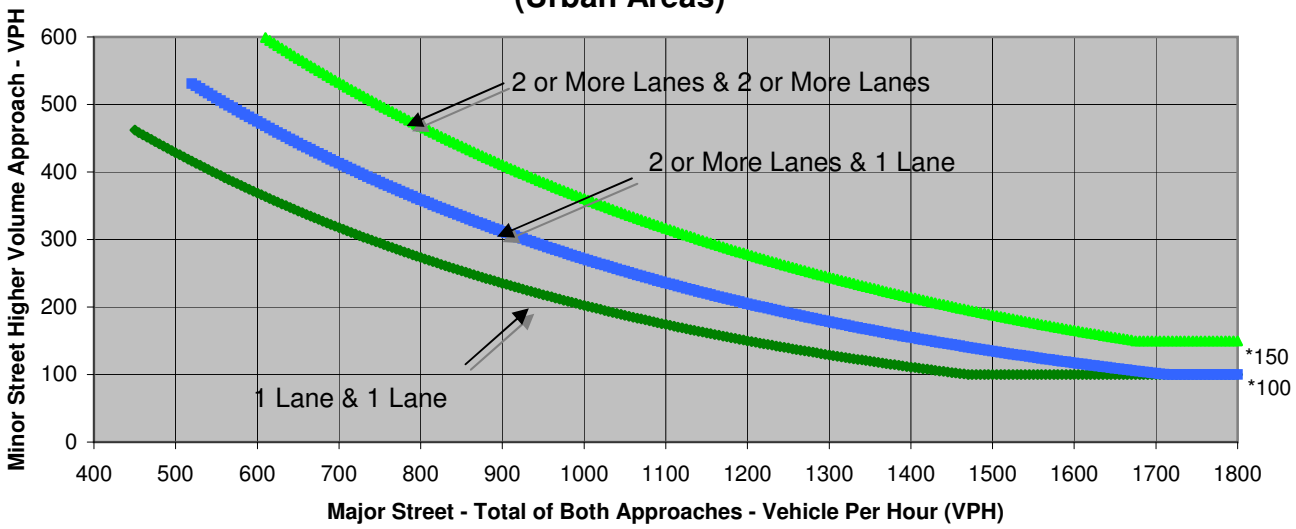
Turn Movement Volumes

	NB	SB	EB	WB
Left	253	104	191	50
Through	1,143	367	275	570
Right	40	160	70	197
Total	1,436	631	536	817

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

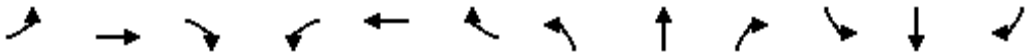


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	2,067	817	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.93		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3418		1770	3306		1770	1827	1583	1770	1719	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3418		1770	3306		1770	1827	1583	1770	1719	
Volume (vph)	240	432	127	200	221	173	111	538	120	360	665	540
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)	253	455	134	211	233	182	117	566	126	379	700	568
RTOR Reduction (vph)	0	25	0	0	134	0	0	0	50	0	24	0
Lane Group Flow (vph)	253	564	0	211	281	0	117	566	76	379	1244	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	11.1	20.1		15.8	24.8		9.9	28.2	28.2	24.7	43.0	
Effective Green, g (s)	11.1	20.1		15.8	24.8		9.9	28.2	28.2	24.7	43.0	
Actuated g/C Ratio	0.11	0.19		0.15	0.24		0.09	0.27	0.27	0.24	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	187	656		267	782		167	492	426	417	705	
v/s Ratio Prot	c0.14	c0.16		c0.12	0.08		0.07	0.31		c0.21	c0.72	
v/s Ratio Perm									0.05			
v/c Ratio	1.35	0.86		0.79	0.36		0.70	1.15	0.18	0.91	1.76	
Uniform Delay, d1	46.9	41.0		42.9	33.4		46.0	38.3	29.4	39.0	30.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	189.7	10.9		14.6	0.3		12.5	89.0	0.9	23.1	349.7	
Delay (s)	236.6	51.9		57.5	33.7		58.5	127.3	30.3	62.1	380.6	
Level of Service	F	D		E	C		E	F	C	E	F	
Approach Delay (s)		107.4			41.7			102.2			307.3	
Approach LOS		F			D			F			F	

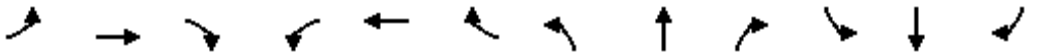
Intersection Summary			
HCM Average Control Delay	179.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	104.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	114.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	320	50	719	95	40	952
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	337	53	757	100	42	1002
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.74	0.74			0.74	
vC, conflicting volume	1895	811			859	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2216	743			808	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	83			93	
cM capacity (veh/h)	33	305			601	

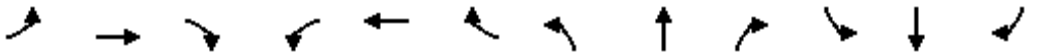
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	389	857	1044
Volume Left	337	0	42
Volume Right	53	100	0
cSH	37	1700	601
Volume to Capacity	10.41	0.50	0.07
Queue Length 95th (ft)	Err	0	6
Control Delay (s)	Err	0.0	2.3
Lane LOS	F		A
Approach Delay (s)	Err	0.0	2.3
Approach LOS	F		

Intersection Summary			
Average Delay	1701.3		
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Volume (vph)	30	13	181	210	32	50	416	734	240	90	1052	130
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)	32	14	191	221	34	53	438	773	253	95	1107	137
RTOR Reduction (vph)	0	0	170	0	0	45	0	0	104	0	0	60
Lane Group Flow (vph)	32	14	21	221	34	8	438	773	149	95	1107	77
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.6	13.1	13.1	12.0	18.5	18.5	25.0	65.6	65.6	13.3	53.9	53.9
Effective Green, g (s)	6.6	13.1	13.1	12.0	18.5	18.5	25.0	65.6	65.6	13.3	53.9	53.9
Actuated g/C Ratio	0.05	0.11	0.11	0.10	0.15	0.15	0.21	0.55	0.55	0.11	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	189	203	171	343	287	241	715	1897	845	196	1559	701
v/s Ratio Prot	0.01	0.01		c0.06	c0.02		c0.13	0.22		0.05	c0.32	
v/s Ratio Perm			0.01			0.01			0.10			0.05
v/c Ratio	0.17	0.07	0.12	0.64	0.12	0.03	0.61	0.41	0.18	0.48	0.71	0.11
Uniform Delay, d1	54.1	48.0	48.3	51.9	43.7	43.2	43.1	15.9	13.6	50.1	26.7	19.1
Progression Factor	1.00	1.00	1.00	1.03	1.03	1.21	1.03	0.98	0.81	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.3	4.1	0.2	0.1	0.6	0.3	0.2	1.9	2.8	0.3
Delay (s)	54.5	48.1	48.6	57.3	45.1	52.2	45.1	15.8	11.2	52.0	29.5	19.5
Level of Service	D	D	D	E	D	D	D	B	B	D	C	B
Approach Delay (s)		49.4			55.1			23.8			30.1	
Approach LOS		D			E			C			C	

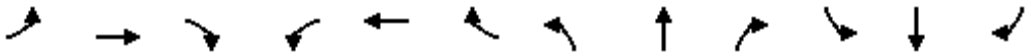
Intersection Summary			
HCM Average Control Delay	31.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1770	1495	1770	1759			1759	1495
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1770	1495	1770	1759			1759	1495
Volume (vph)	0	0	0	1110	0	510	1160	880	0	0	773	670
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	0	0	1168	0	537	1221	926	0	0	814	705
RTOR Reduction (vph)	0	0	0	0	0	73	0	0	0	0	0	286
Lane Group Flow (vph)	0	0	0	0	1168	464	1221	926	0	0	814	419
Heavy Vehicles (%)	0%	2%	2%	2%	2%	8%	2%	8%	2%	2%	8%	8%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					46.0	46.0	14.0	66.0			48.0	48.0
Effective Green, g (s)					46.0	46.0	14.0	66.0			48.0	48.0
Actuated g/C Ratio					0.38	0.38	0.12	0.55			0.40	0.40
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					679	573	207	967			704	598
v/s Ratio Prot							c0.69	0.53			c0.46	
v/s Ratio Perm					0.66	0.31						0.28
v/c Ratio					1.72	0.81	5.90	0.96			1.16	0.70
Uniform Delay, d1					37.0	33.1	53.0	25.7			36.0	30.0
Progression Factor					1.00	1.00	1.27	0.31			0.70	1.15
Incremental Delay, d2					330.3	8.5	2205.3	3.2			82.0	4.9
Delay (s)					367.3	41.6	2272.6	11.3			107.2	39.5
Level of Service					F	D	F	B			F	D
Approach Delay (s)		0.0			264.7			1297.3			75.8	
Approach LOS		A			F			F			E	

Intersection Summary			
HCM Average Control Delay	624.1	HCM Level of Service	F
HCM Volume to Capacity ratio	2.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	177.2%	ICU Level of Service	H
Analysis Period (min)	15		

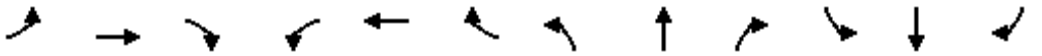
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1671	1583					1863	1583	1671	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1671	1583					1863	1583	1671	1863	
Volume (vph)	290	0	450	0	0	0	0	1750	805	293	1590	0
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)	305	0	474	0	0	0	0	1842	847	308	1674	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	0	179	0	0	0
Lane Group Flow (vph)	0	305	462	0	0	0	0	1842	668	308	1674	0
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		38.4	38.4					46.0	46.0	23.6	73.6	
Effective Green, g (s)		38.4	38.4					46.0	46.0	23.6	73.6	
Actuated g/C Ratio		0.32	0.32					0.38	0.38	0.20	0.61	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		535	507					714	607	329	1143	
v/s Ratio Prot								c0.99		0.18	c0.90	
v/s Ratio Perm		0.18	c0.29						0.42			
v/c Ratio		0.57	0.91					2.58	1.10	0.94	1.46	
Uniform Delay, d1		33.9	39.2					37.0	37.0	47.5	23.2	
Progression Factor		1.00	1.00					1.00	1.00	0.25	0.44	
Incremental Delay, d2		1.5	20.5					715.0	66.8	5.4	209.5	
Delay (s)		35.4	59.7					752.0	103.8	17.1	219.7	
Level of Service		D	E					F	F	B	F	
Approach Delay (s)		50.2			0.0			547.9			188.2	
Approach LOS		D			A			F			F	

Intersection Summary			
HCM Average Control Delay	345.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	177.2%	ICU Level of Service	H
Analysis Period (min)	15		

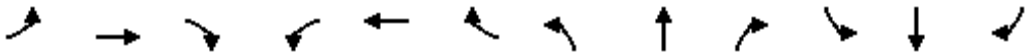
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	470	40	20	127	35	670	43	1415	181	370	995	675
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	495	42	21	134	37	705	45	1489	191	389	1047	711
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											720	
pX, platoon unblocked	0.43	0.43	0.43	0.43	0.43		0.43					
vC, conflicting volume	3777	3597	1047	3438	4117	1489	1758			1680		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	7438	7019	1110	6651	8225	1489	2757			1680		
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	0	81	0	0	0	27			0		
cM capacity (veh/h)	0	0	110	0	0	152	62			381		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	558	134	742	45	1489	191	389	1047	711
Volume Left	495	134	0	45	0	0	389	0	0
Volume Right	21	0	705	0	0	191	0	0	711
cSH	0	0	0	62	1700	1700	381	1700	1700
Volume to Capacity	Err	Err	Err	0.73	0.88	0.11	1.02	0.62	0.42
Queue Length 95th (ft)	Err	Err	Err	80	0	0	316	0	0
Control Delay (s)	Err	Err	Err	152.9	0.0	0.0	85.6	0.0	0.0
Lane LOS	F	F	F	F			F		
Approach Delay (s)	Err	Err		4.0			15.5		
Approach LOS	F	F							

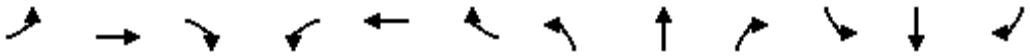
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	154.1%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	200	311	40	83	537	514	20	925	30	137	315	690
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	211	327	42	87	565	541	21	974	32	144	332	726

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	580	1194	1026	1202
Volume Left (vph)	211	87	21	144
Volume Right (vph)	42	541	32	726
Hadj (s)	0.06	-0.22	0.02	-0.30
Departure Headway (s)	9.6	9.3	9.6	9.3
Degree Utilization, x	1.55	3.10	2.73	3.09
Capacity (veh/h)	387	398	386	401
Control Delay (s)	285.3	969.9	806.9	967.3
Approach Delay (s)	285.3	969.9	806.9	967.3
Approach LOS	F	F	F	F

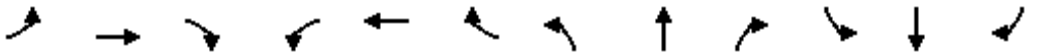
Intersection Summary			
Delay	828.1		
HCM Level of Service	F		
Intersection Capacity Utilization	215.7%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3384		1770	3269		1770	3367	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3384		1770	3269		1770	3367	
Volume (vph)	150	400	192	301	170	70	194	547	164	70	481	230
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)	158	421	202	317	179	74	204	576	173	74	506	242
RTOR Reduction (vph)	0	0	147	0	57	0	0	33	0	0	69	0
Lane Group Flow (vph)	158	421	55	317	196	0	204	716	0	74	679	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	9.4	20.7	20.7	6.0	17.3		11.8	27.9		6.0	22.1	
Effective Green, g (s)	9.4	20.7	20.7	6.0	17.3		11.8	27.9		6.0	22.1	
Actuated g/C Ratio	0.12	0.27	0.27	0.08	0.23		0.15	0.36		0.08	0.29	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	217	503	428	139	764		273	1191		139	971	
v/s Ratio Prot	0.09	c0.23		c0.18	0.06		c0.12	0.22		0.04	c0.20	
v/s Ratio Perm			0.03									
v/c Ratio	0.73	0.84	0.13	2.28	0.26		0.75	0.60		0.53	0.70	
Uniform Delay, d1	32.4	26.4	21.1	35.3	24.4		31.0	19.8		34.0	24.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.5	11.6	0.1	598.5	0.2		10.6	2.2		3.9	4.2	
Delay (s)	43.9	37.9	21.3	633.8	24.5		41.6	22.1		37.8	28.5	
Level of Service	D	D	C	F	C		D	C		D	C	
Approach Delay (s)		34.8			363.4			26.3			29.3	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM Average Control Delay	90.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	76.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

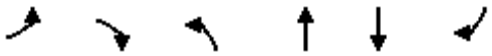
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.93		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1667		1770	1732		1770	3304		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1667		1770	1732		1770	3304		1770	1863	1583
Volume (vph)	80	90	212	210	90	80	159	821	113	120	933	20
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)	84	95	223	221	95	84	167	864	119	126	982	21
RTOR Reduction (vph)	0	136	0	0	50	0	0	14	0	0	0	12
Lane Group Flow (vph)	84	182	0	221	129	0	167	969	0	126	982	9
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	4.7	12.5		6.0	13.8		6.0	22.8		6.3	23.1	4.7
Effective Green, g (s)	4.7	12.5		6.0	13.8		6.0	22.8		6.3	23.1	4.7
Actuated g/C Ratio	0.07	0.20		0.09	0.22		0.09	0.36		0.10	0.36	0.07
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	131	328		167	376		167	1184		175	677	117
v/s Ratio Prot	0.05	c0.11		c0.12	0.07		c0.09	0.29		0.07	c0.53	0.01
v/s Ratio Perm												
v/c Ratio	0.64	0.56		1.32	0.34		1.00	0.82		0.72	1.45	0.08
Uniform Delay, d1	28.6	23.0		28.8	21.1		28.8	18.5		27.8	20.2	27.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.3	2.0		181.0	0.5		69.6	6.4		13.3	211.0	0.3
Delay (s)	38.9	25.1		209.8	21.6		98.4	24.9		41.1	231.2	27.7
Level of Service	D	C		F	C		F	C		D	F	C
Approach Delay (s)		28.0			125.6			35.6			206.2	
Approach LOS		C			F			D			F	

Intersection Summary			
HCM Average Control Delay	108.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		

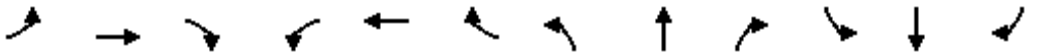
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	40	150	97	1104	1313	30
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	158	102	1162	1382	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				306		
pX, platoon unblocked	0.72					
vC, conflicting volume	2764	1398	1414			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3463	1398	1414			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	8	79			
cM capacity (veh/h)	4	172	482			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	200	1264	1414
Volume Left	42	102	0
Volume Right	158	0	32
cSH	18	482	1700
Volume to Capacity	10.92	0.21	0.83
Queue Length 95th (ft)	Err	20	0
Control Delay (s)	Err	10.1	0.0
Lane LOS	F	B	
Approach Delay (s)	Err	10.1	0.0
Approach LOS	F		

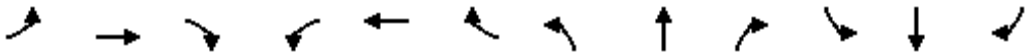
Intersection Summary			
Average Delay	699.3		
Intersection Capacity Utilization	155.9%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1671	1583	1770	1759			1863	1583
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1671	1583	1770	1759			1863	1583
Volume (vph)	0	0	0	253	0	350	828	851	0	0	803	660
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	0	0	266	0	368	872	896	0	0	845	695
RTOR Reduction (vph)	0	0	0	0	0	185	0	0	0	0	0	262
Lane Group Flow (vph)	0	0	0	0	266	184	872	896	0	0	845	433
Heavy Vehicles (%)	2%	2%	2%	8%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					21.6	21.6	26.4	90.4			60.0	60.0
Effective Green, g (s)					21.6	21.6	26.4	90.4			60.0	60.0
Actuated g/C Ratio					0.18	0.18	0.22	0.75			0.50	0.50
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					301	285	389	1325			932	792
v/s Ratio Prot							c0.49	0.51			c0.45	
v/s Ratio Perm					0.16	0.12						0.27
v/c Ratio					0.88	0.64	2.24	0.68			0.91	0.55
Uniform Delay, d1					48.0	45.6	46.8	7.4			27.4	20.6
Progression Factor					1.00	1.00	0.88	0.33			1.00	1.00
Incremental Delay, d2					24.9	4.9	559.5	0.3			14.1	2.7
Delay (s)					72.9	50.6	600.6	2.7			41.5	23.3
Level of Service					E	D	F	A			D	C
Approach Delay (s)		0.0			59.9			297.6			33.3	
Approach LOS		A			E			F			C	

Intersection Summary			
HCM Average Control Delay	156.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	113.9%	ICU Level of Service	H
Analysis Period (min)	15		

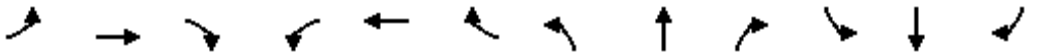
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1495					1759	1495	1770	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1495					1759	1495	1770	1863	
Volume (vph)	220	0	402	0	0	0	0	1459	259	270	786	0
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)	232	0	423	0	0	0	0	1536	273	284	827	0
RTOR Reduction (vph)	0	0	108	0	0	0	0	0	59	0	0	0
Lane Group Flow (vph)	0	232	315	0	0	0	0	1536	214	284	827	0
Heavy Vehicles (%)	2%	2%	8%	2%	2%	2%	2%	8%	8%	2%	2%	8%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		28.9	28.9					49.0	49.0	30.1	83.1	
Effective Green, g (s)		28.9	28.9					49.0	49.0	30.1	83.1	
Actuated g/C Ratio		0.24	0.24					0.41	0.41	0.25	0.69	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		426	360					718	610	444	1290	
v/s Ratio Prot								c0.87		0.16	c0.44	
v/s Ratio Perm		0.13	c0.21						0.14			
v/c Ratio		0.54	0.88					2.14	0.35	0.64	0.64	
Uniform Delay, d1		39.8	43.8					35.5	24.5	40.1	10.2	
Progression Factor		1.00	1.00					0.86	1.11	0.82	0.18	
Incremental Delay, d2		1.4	20.4					515.8	1.1	1.3	1.0	
Delay (s)		41.2	64.2					546.2	28.4	34.0	2.8	
Level of Service		D	E					F	C	C	A	
Approach Delay (s)		56.1			0.0			468.0			10.8	
Approach LOS		E			A			F			B	

Intersection Summary			
HCM Average Control Delay	250.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	113.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



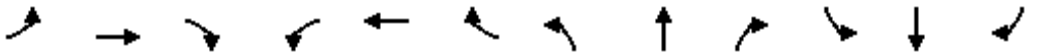
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Volume (vph)	93	6	38	87	8	295	70	1322	127	535	546	47
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)	98	6	40	92	8	311	74	1392	134	563	575	49
RTOR Reduction (vph)	0	0	38	0	0	280	0	0	44	0	0	17
Lane Group Flow (vph)	98	6	2	92	8	31	74	1392	90	563	575	32
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.6	6.0	6.0	13.4	11.8	11.8	6.2	58.8	58.8	25.8	78.4	78.4
Effective Green, g (s)	7.6	6.0	6.0	13.4	11.8	11.8	6.2	58.8	58.8	25.8	78.4	78.4
Actuated g/C Ratio	0.06	0.05	0.05	0.11	0.10	0.10	0.05	0.49	0.49	0.22	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	177	79	383	348	274	177	1734	1366	738	2312	1034
v/s Ratio Prot	c0.03	0.00		c0.03	0.00		0.02	c0.39		c0.16	0.16	
v/s Ratio Perm			0.00			c0.01			0.03			0.02
v/c Ratio	0.45	0.03	0.03	0.24	0.02	0.11	0.42	0.80	0.07	0.76	0.25	0.03
Uniform Delay, d1	54.2	54.2	54.2	48.7	48.9	49.3	55.2	25.7	16.1	44.2	8.6	7.4
Progression Factor	1.15	0.70	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.07	0.77	0.65
Incremental Delay, d2	1.5	0.1	0.1	0.3	0.0	0.2	1.6	4.0	0.1	3.2	0.2	0.0
Delay (s)	63.6	37.8	27.0	49.0	48.9	49.5	56.7	29.8	16.2	50.4	6.8	4.8
Level of Service	E	D	C	D	D	D	E	C	B	D	A	A
Approach Delay (s)		52.3			49.4			29.9			27.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	32.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection has too many lanes per leg.

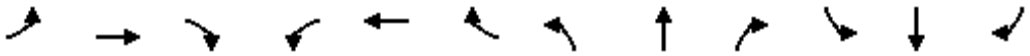
HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.



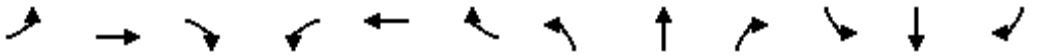
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1488
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1488
Volume (vph)	0	0	0	260	0	310	520	944	0	0	410	980
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	0	0	274	0	326	547	994	0	0	432	1032
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	452
Lane Group Flow (vph)	0	0	0	0	274	326	547	994	0	0	432	580
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					22.7	120.0	46.3	89.3			39.0	39.0
Effective Green, g (s)					22.7	120.0	46.3	89.3			39.0	39.0
Actuated g/C Ratio					0.19	1.00	0.39	0.74			0.32	0.32
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					328	1492	670	1334			582	484
v/s Ratio Prot					c0.16		c0.32	0.55			0.24	
v/s Ratio Perm						0.22						c0.39
v/c Ratio					0.84	0.22	0.82	0.75			0.74	1.20
Uniform Delay, d1					46.9	0.0	33.0	8.8			36.0	40.5
Progression Factor					1.00	1.00	0.06	0.22			1.00	1.00
Incremental Delay, d2					16.6	0.3	0.7	0.4			8.3	107.6
Delay (s)					63.4	0.3	2.6	2.3			44.3	148.1
Level of Service					E	A	A	A			D	F
Approach Delay (s)		0.0			29.1			2.4			117.5	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	53.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	126.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.96		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1517					1731		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1517					1731		1703	1827	
Volume (vph)	524	0	460	0	0	0	0	940	460	170	500	0
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)	552	0	484	0	0	0	0	989	484	179	526	0
RTOR Reduction (vph)	0	0	184	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	552	300	0	0	0	0	1460	0	179	526	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		40.0	40.0					48.2		19.8	72.0	
Effective Green, g (s)		40.0	40.0					48.2		19.8	72.0	
Actuated g/C Ratio		0.33	0.33					0.40		0.17	0.60	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		568	506					695		281	1096	
v/s Ratio Prot		c0.32						c0.84		c0.11	0.29	
v/s Ratio Perm			0.20									
v/c Ratio		0.97	0.59					2.10		0.64	0.48	
Uniform Delay, d1		39.4	33.2					35.9		46.7	13.5	
Progression Factor		1.00	1.00					1.00		1.34	0.23	
Incremental Delay, d2		30.5	1.9					500.1		3.1	0.9	
Delay (s)		70.0	35.1					536.0		65.7	3.9	
Level of Service		E	D					F		E	A	
Approach Delay (s)		53.7			0.0			536.0			19.6	
Approach LOS		D			A			F			B	

Intersection Summary			
HCM Average Control Delay	267.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	126.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	120	0	70	0	0	0	250	1280	0	0	590	370
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	126	0	74	0	0	0	263	1347	0	0	621	389
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	2495	2495	621	2568	2884	1347	1011			1347		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2619	2619	589	2699	3041	1347	1011			1347		
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	100	84	100	100	100	58			100		
cM capacity (veh/h)	10	13	469	7	7	185	633			511		

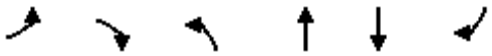
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	126	74	0	263	1347	621	389
Volume Left	126	0	0	263	0	0	0
Volume Right	0	74	0	0	0	0	389
cSH	10	469	1700	633	1700	1700	1700
Volume to Capacity	12.69	0.16	0.00	0.42	0.79	0.37	0.23
Queue Length 95th (ft)	Err	14	0	51	0	0	0
Control Delay (s)	Err	14.1	0.0	14.7	0.0	0.0	0.0
Lane LOS	F	B	A	B			
Approach Delay (s)	6320.4		0.0	2.4		0.0	
Approach LOS	F		A				

Intersection Summary				
Average Delay	449.5			
Intersection Capacity Utilization	80.7%	ICU Level of Service	D	
Analysis Period (min)	15			

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

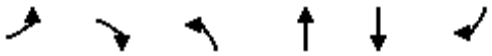
Channelized right turn lanes are not counted.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	0	1710	1128	57
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	1800	1187	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				370	489	
pX, platoon unblocked	0.66					
vC, conflicting volume	2117	624	1247			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2178	624	1247			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	26	428	554			

Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	900	900	792	456
Volume Left	0	0	0	0
Volume Right	0	0	0	60
cSH	1700	1700	1700	1700
Volume to Capacity	0.53	0.53	0.47	0.27
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0		0.0	
Approach LOS				

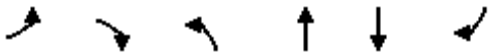
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	16	0	1519	633	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	17	0	1599	666	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					310	
pX, platoon unblocked	0.94	0.94	0.94			
vC, conflicting volume	1486	353	706			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1451	240	618			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	114	712	897			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	17	799	799	444	262
Volume Left	0	0	0	0	0
Volume Right	17	0	0	0	40
cSH	712	1700	1700	1700	1700
Volume to Capacity	0.02	0.47	0.47	0.26	0.15
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	10.2	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.2	0.0		0.0	
Approach LOS	B				

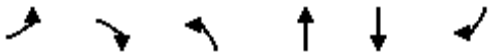
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	16	5	27	1503	633	16
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	17	5	28	1582	666	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					530	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	1523	342	683			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1496	248	609			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	99	97			
cM capacity (veh/h)	104	712	914			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	17	5	28	791	791	444	239
Volume Left	17	0	28	0	0	0	0
Volume Right	0	5	0	0	0	0	17
cSH	104	712	914	1700	1700	1700	1700
Volume to Capacity	0.16	0.01	0.03	0.47	0.47	0.26	0.14
Queue Length 95th (ft)	14	1	2	0	0	0	0
Control Delay (s)	46.1	10.1	9.1	0.0	0.0	0.0	0.0
Lane LOS	E	B	A				
Approach Delay (s)	37.6		0.2			0.0	
Approach LOS	E						

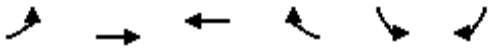
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	5	0	1530	626	11
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	5	0	1611	659	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					720	
pX, platoon unblocked	0.96	0.96	0.96			
vC, conflicting volume	1470	335	671			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1448	265	615			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	117	703	922			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	5	805	805	439	231
Volume Left	0	0	0	0	0
Volume Right	5	0	0	0	12
cSH	703	1700	1700	1700	1700
Volume to Capacity	0.01	0.47	0.47	0.26	0.14
Queue Length 95th (ft)	1	0	0	0	0
Control Delay (s)	10.2	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.2	0.0		0.0	
Approach LOS	B				

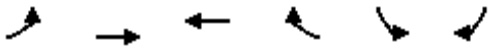
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	45.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	533	973	7	0	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	561	1024	7	0	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1032				1308	516
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1032				1308	516
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	669				151	504

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	281	281	683	349	1
Volume Left	0	0	0	0	0
Volume Right	0	0	0	7	1
cSH	1700	1700	1700	1700	504
Volume to Capacity	0.17	0.17	0.40	0.21	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	12.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.2
Approach LOS					B

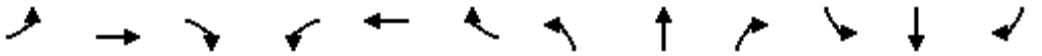
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	0	15	11	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	16	12	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			451			
pX, platoon unblocked						
vC, conflicting volume	16				8	8
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16				8	8
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1600				1011	1072

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	0	0	0	16	12	0
Volume Left	0	0	0	0	12	0
Volume Right	0	0	0	16	0	0
cSH	1700	1700	1700	1700	1011	1700
Volume to Capacity	0.00	0.00	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	0	0	0	1	0
Control Delay (s)	0.0	0.0	0.0	0.0	8.6	0.0
Lane LOS					A	A
Approach Delay (s)	0.0		0.0		8.6	
Approach LOS					A	

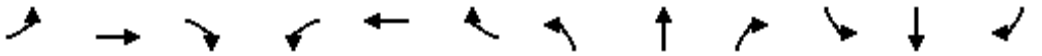
Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	11	0	5	15	16	0	0	3	12	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	12	0	5	16	17	0	0	3	13	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	33			12			30	55	6	44	46	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	33			12			30	55	6	44	46	16
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	100
cM capacity (veh/h)	1578			1606			972	833	1075	948	842	1059

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	6	6	5	11	22	3	13
Volume Left	0	0	5	0	0	0	13
Volume Right	0	0	0	0	17	3	0
cSH	1700	1700	1606	1700	1700	1075	948
Volume to Capacity	0.00	0.00	0.00	0.01	0.01	0.00	0.01
Queue Length 95th (ft)	0	0	0	0	0	0	1
Control Delay (s)	0.0	0.0	7.2	0.0	0.0	8.4	8.8
Lane LOS			A			A	A
Approach Delay (s)	0.0		1.0			8.4	8.8
Approach LOS						A	A

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95		0.97	0.95			1.00	1.00		1.00	
Frt		1.00		1.00	0.91			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.97	
Satd. Flow (prot)		3539		3433	3214			1863	1583		1798	
Flt Permitted		1.00		0.95	1.00			1.00	1.00		0.79	
Satd. Flow (perm)		3539		3433	3214			1863	1583		1463	
Volume (vph)	0	26	0	32	36	57	0	25	44	67	26	0
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	27	0	34	38	60	0	26	46	71	27	0
RTOR Reduction (vph)	0	0	0	0	52	0	0	0	21	0	0	0
Lane Group Flow (vph)	0	27	0	34	46	0	0	26	25	0	98	0
Turn Type	Prot			Prot			Split		Perm	Perm		Perm
Protected Phases	7	4		3	8		2	2			6	
Permitted Phases									2	6		6
Actuated Green, G (s)		8.1		4.1	16.2			66.4	66.4		25.4	
Effective Green, g (s)		8.1		4.1	16.2			66.4	66.4		25.4	
Actuated g/C Ratio		0.07		0.03	0.13			0.55	0.55		0.21	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		239		117	434			1031	876		310	
v/s Ratio Prot		0.01		c0.01	c0.01			0.01				
v/s Ratio Perm									c0.02		c0.07	
v/c Ratio		0.11		0.29	0.11			0.03	0.03		0.32	
Uniform Delay, d1		52.6		56.5	45.5			12.1	12.2		40.0	
Progression Factor		1.00		0.50	0.14			1.00	1.00		1.00	
Incremental Delay, d2		0.2		1.4	0.1			0.0	0.1		2.7	
Delay (s)		52.8		29.5	6.5			12.2	12.2		42.6	
Level of Service		D		C	A			B	B		D	
Approach Delay (s)		52.8			12.4			12.2			42.6	
Approach LOS		D			B			B			D	

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec): 100 | Critical Vol./Cap.(X): 3.651
Loss Time (sec): 0 (Y+R=4.0 sec) | Average Delay (sec/veh): 512.9
Optimal Cycle: 0 | Level Of Service: F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	250	1110	40	85	350	140	165	275	70	50	570	170
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	250	1110	40	85	350	140	165	275	70	50	570	170
Added Vol:	0	36	0	15	23	12	23	0	0	0	0	23
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	250	1146	40	100	373	152	188	275	70	50	570	193
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	250	1146	40	100	373	152	188	275	70	50	570	193
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	250	1146	40	100	373	152	188	275	70	50	570	193
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	250	1146	40	100	373	152	188	275	70	50	570	193
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	300	314	328	292	310	325	294	308	324	291	309	325
Capacity Analysis Module:												
Vol/Sat:	0.83	3.65	0.12	0.34	1.20	0.47	0.64	0.89	0.22	0.17	1.84	0.59
Crit Moves:		****			****			****			****	
Delay/Veh:	53.6	1223	14.9	20.9	152	22.7	34.0	62.9	16.6	17.3	418	28.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	53.6	1223	14.9	20.9	152	22.7	34.0	62.9	16.6	17.3	418	28.1
LOS by Move:	F	F	B	C	F	C	D	F	C	C	F	D
ApproachDel:	985.7			99.7			46.6			301.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	985.7			99.7			46.6			301.1		
LOS by Appr:	F			F			E			F		
AllWayAvgQ:	3.2	105	0.1	0.5	11.9	0.8	1.6	4.1	0.3	0.2	34.7	1.3

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #14

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0307			0.0307			0.0000			0.0307		
P[C5]:	0.9693			0.9693			1.0000			0.9693		
Padj[C1]:	0.03969			0.03969			0.04000			0.03969		
Padj[C2]:	0.02969			0.02969			0.03000			0.02969		
Padj[C3]:	0.01969			0.01969			0.02000			0.01969		
Padj[C4]:	0.00785			0.00785			0.01000			0.00785		
Padj[C5]:	-0.09693			-0.09693			-0.10000			-0.09693		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	250	40		100	152		188	70		50	193	
Capacity:	300	328		292	325		294	324		291	325	
DegOfUtil:	0.83	0.12		0.34	0.46		0.64	0.21		0.17	0.59	
DepHeadway:	11.97	10.77		12.13	10.93		12.19	10.99		12.15	10.95	
ServiceTime:	9.7	8.5		9.8	8.6		9.9	8.7		9.9	8.7	
Delay:	53.6	14.9		20.9	22.7		34.0	16.6		17.3	28.1	
Queue:	3.2	0.1		0.5	0.8		1.6	0.3		0.2	1.3	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	1146			373			275			570		
Capacity:	314			310			308			309		
DegOfUtil:	3.65			1.20			0.89			1.84		
DepHeadway:	11.47			11.63			11.69			11.65		
ServiceTime:	9.2			9.3			9.4			9.4		
Delay:	1222.9			152.2			62.9			418.4		
Queue:	105.4			11.9			4.1			34.7		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	985.7			99.7			46.6			301.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	985.7			99.7			46.6			301.1		
LOS by Appr:	F			F			E			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	512.9
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	250	1146	40	100	373	152	188	275	70	50	570	193

Major Street Volume: 2061
Minor Approach Volume: 813
Minor Approach Volume Threshold: 63 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec):	100	Critical Vol./Cap.(X):	1.887
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	255.8
Optimal Cycle:	0	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	110	550	80	245	270	145	380	220	55	40	525	600
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	110	550	80	245	270	145	380	220	55	40	525	600
Added Vol:	11	0	0	0	0	0	0	4	7	0	7	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	121	550	80	245	270	145	380	224	62	40	532	600
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	121	550	80	245	270	145	380	224	62	40	532	600
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	121	550	80	245	270	145	380	224	62	40	532	600
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	121	550	80	245	270	145	380	224	62	40	532	600
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	278	291	306	289	301	319	285	296	312	286	302	320
Capacity Analysis Module:												
Vol/Sat:	0.44	1.89	0.26	0.85	0.90	0.45	1.33	0.76	0.20	0.14	1.76	1.87
Crit Moves:		****			****			****				****
Delay/Veh:	24.9	437	18.3	57.6	64.3	22.9	204.4	44.1	16.9	17.1	384	429.6
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	24.9	437	18.3	57.6	64.3	22.9	204.4	44.1	16.9	17.1	384	429.6
LOS by Move:	C	F	C	F	F	C	F	E	C	C	F	F
ApproachDel:	326.3			52.7			133.0			394.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	326.3			52.7			133.0			394.9		
LOS by Appr:	F			F			F			F		
AllWayAvgQ:	0.7	34.2	0.3	3.4	4.2	0.8	15.0	2.4	0.2	0.2	31.0	37.0

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #18

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0089			0.0000			0.0089			0.0089		
P[C5]:	0.9911			1.0000			0.9911			0.9911		
Padj[C1]:	0.03991			0.04000			0.03991			0.03991		
Padj[C2]:	0.02991			0.03000			0.02991			0.02991		
Padj[C3]:	0.01991			0.02000			0.01991			0.01991		
Padj[C4]:	0.00938			0.01000			0.00938			0.00938		
Padj[C5]:	-0.09911			-0.10000			-0.09911			-0.09911		
Lanes:	L1		L2	L1		L2	L1		L2	L1		L2
LaneType:	LEFT		RITE	LEFT		RITE	LEFT		RITE	LEFT		RITE
HeadwayAdj:	0.500		-0.700	0.500		-0.700	0.500		-0.700	0.500		-0.700
Volume:	121		80	245		145	380		62	40		600
Capacity:	278		306	289		319	285		312	286		320
DegOfUtil:	0.43		0.26	0.85		0.45	1.33		0.20	0.14		1.87
DepHeadway:	12.83		11.63	12.44		11.24	12.61		11.41	12.44		11.24
ServiceTime:	10.5		9.3	10.1		8.9	10.3		9.1	10.1		8.9
Delay:	24.9		18.3	57.6		22.9	204.4		16.9	17.1		429.6
Queue:	0.7		0.3	3.4		0.8	15.0		0.2	0.2		37.0
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	550			270			224			532		
Capacity:	291			301			296			302		
DegOfUtil:	1.88			0.90			0.75			1.76		
DepHeadway:	12.33			11.94			12.11			11.94		
ServiceTime:	10.0			9.6			9.8			9.6		
Delay:	437.4			64.3			44.1			384.2		
Queue:	34.2			4.2			2.4			31.0		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	326.3			52.7			133.0			394.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	326.3			52.7			133.0			394.9		
LOS by Appr:	F			F			F			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	255.8
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	121	550	80	245	270	145	380	224	62	40	532	600

Major Street Volume: 1838
Minor Approach Volume: 751
Minor Approach Volume Threshold: 112 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Cumulative Plus Project PM

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: I-5 to Yosemite
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7273	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1976	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2727	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2727	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Yosemite to Airport
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Commercial EIR

Flow Inputs and Adjustments

Volume, V	8375	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2276	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	3186	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3186	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Airport to Union
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	7869	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2138	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2994	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2994	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Union to Main
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6558	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1782	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2495	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2495	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Eastbound
From/To: Main to SR 99
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	5197	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1412	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1977	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1977	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	61.8	mi/h
Number of lanes, N	3	
Density, D	32.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: SR 99 to Main
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4395	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1194	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1672	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1672	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	3	
Density, D	25.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Main to Union
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4487	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1219	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1707	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1707	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	3	
Density, D	26.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Union to Airport
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4634	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1259	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1763	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1763	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.2	mi/h
Number of lanes, N	3	
Density, D	27.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Airport to Yosemite
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4488	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1220	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1707	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1707	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	3	
Density, D	26.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR 120 Westbound
From/To: Yosemite to I-5
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4938	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1313	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1812	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1812	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.8	mi/h
Number of lanes, N	3	
Density, D	28.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Jack Tone to Austin
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6177	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1626	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2319	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2319	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	53.3	mi/h
Number of lanes, N	3	
Density, D	43.5	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Northbound
From/To: Yosemite to Lathrop
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	4128	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1086	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2325	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2325	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	53.1	mi/h
Number of lanes, N	2	
Density, D	43.8	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Lathrop to Yosemite
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	6292	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1656	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	3543	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3543	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: SR-120 to Austin
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	8265	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2175	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	3103	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3103	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.21

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Fehr & Peers
Agency or Company: Fehr & Peers
Date Performed: 9/10/08
Analysis Time Period: PM Peak Hour
Freeway/Direction: SR-99 Southbound
From/To: Austin to Jack Tone
Jurisdiction: City of Manteca
Analysis Year: C+P Conditions
Description: Union Crossing EIR

Flow Inputs and Adjustments

Volume, V	8762	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2306	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	3290	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	3290	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8375	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	2060	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8375	2060		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	2276	644		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9558	2639		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.400 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_R = 5404$ pc/h
FD

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	9558	7050	Yes
$v_{FO} = v - v_R$	6919	7050	No
v_R	2639	2000	Yes

$v_{av34} = v_R$ 4154 pc/h (Equation 25-15 or 25-16)

Is $v_{av34} = v_R$ > 2700 pc/h? Yes

Is $v_{av34} = v_R$ > 1.5 v_{12} /2 Yes

If yes, $v_{12A} = 6858$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	6858	4600	No !

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 61.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $D_S = 0.666$

Space mean speed in ramp influence area, $S_R = 49.7$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 53.2$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6315	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1554	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6315	1554		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1716	422		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7207	1731		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 4263$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8938	7050	Yes

$v_{3 \text{ or } av34} = v_{12} = 2944$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 4507$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4507	4400	No !

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_{12} + 0.0078 v_R - 0.00627 L_A = 50.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 2.282$

Space mean speed in ramp influence area, $S_R = 12.5$ mph

Space mean speed in outer lanes, $S_0 = 56.1$ mph

Space mean speed for all vehicles, $S = 16.3$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7869	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1918	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7869	1918		vph
Peak-hour factor, PHF	0.92	0.80		
Peak 15-min volume, v15	2138	599		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	8981	2457		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.422 Using Equation 5

FD
$v_{12} = v_R + (v_F - v_R) P_{FD} = 5213$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8981	7050	Yes
$v_{FO} = v_F - v_R$	6524	7050	No
v_R	2457	2000	Yes

$v_{3 \text{ or } av34} = v_R$ 3768 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 6281$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	6281	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 56.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $D_S = 0.649$

Space mean speed in ramp influence area, $S_R = 50.1$ mph

Space mean speed in outer lanes, $S_0 = 64.7$ mph

Space mean speed for all vehicles, $S = 53.7$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/2008
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 EB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5951	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	607	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5951	607		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1617	165		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6792	676		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 4017$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7468	7050	Yes

$v_{3 \text{ or } av34} = 2775$ pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} = 4092$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4092	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_{12} + 0.0078 v_R - 0.00627 L_A = 39.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 0.745$

Space mean speed in ramp influence area, $S_R = 47.9$ mph

Space mean speed in outer lanes, $S_0 = 56.1$ mph

Space mean speed for all vehicles, $S = 50.5$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4487	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	763	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4487	763		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1219	201		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	5121	823		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.594 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3377$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_i = v_F$	5121	7050	No
$v_o = v - v_R$	4298	7050	No
v_R	823	2000	No

$v_{3 \text{ or } av34} = v_{12}$ 1744 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3377	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 31.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.502$

Space mean speed in ramp influence area, $S_R = 53.5$ mph

Space mean speed in outer lanes, $S_0 = 68.4$ mph

Space mean speed for all vehicles, $S = 57.8$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Union Road
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3724	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	910	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3724	910		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1012	247		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4250	1014		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 2514$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5264	7050	No

$v_{3 \text{ or } av34} = v_{av34}$ 1736 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2514	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_{12} + 0.0078 v_R - 0.00627 L_A = 29.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_S = 0.419$

Space mean speed in ramp influence area, $S_R = 55.4$ mph

Space mean speed in outer lanes, $S_0 = 60.6$ mph

Space mean speed for all vehicles, $S = 57.0$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4634	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1346	vph
Length of first accel/decel lane	150	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4634	1346		vph
Peak-hour factor, PHF	0.92	0.95		
Peak 15-min volume, v15	1259	354		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	5289	1452		pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
EQ
P = 0.561 Using Equation 5

FD
$v_{12} = v_R + (v - v_F) P_{FD} = 3604$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_i = v_F$	5289	7050	No
$v_{FO} = v - v_R$	3837	7050	No
v_R	1452	2000	No

$v_{3 \text{ or } av34} = v_R$ 1685 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3604	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 33.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $D_S = 0.559$

Space mean speed in ramp influence area, $S_R = 52.2$ mph

Space mean speed in outer lanes, $S_0 = 68.6$ mph

Space mean speed for all vehicles, $S = 56.5$ mph

HCS+: Ramps and Ramp Junctions Release 5.21

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Fehr and Peers
Agency/Co.: Fehr and Peers
Date performed: 9/10/08
Analysis time period: PM Peak
Freeway/Dir of Travel: SR 120 WB
Junction: Airport Way
Jurisdiction: City of Manteca
Analysis Year: Cumulative + P
Description: Union Crossing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3288	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1200	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3288	1200		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	893	326		v
Trucks and buses	10	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.952	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3753	1337		pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.591 Using Equation 1

FM
$v_{12} = v_F (P_{FM}) = 2220$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5090	7050	No

$v_{3 \text{ or } av34} = v_{12}$ 1533 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$ No

If yes, $v_{12A} =$ (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2220	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_{12A} - 0.00627\, L_A = 29.5$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_S = 0.423$

Space mean speed in ramp influence area, $S_R = 55.3$ mph

Space mean speed in outer lanes, $S_0 = 61.3$ mph

Space mean speed for all vehicles, $S = 57.0$ mph

Leisch Method for Weaving Analysis

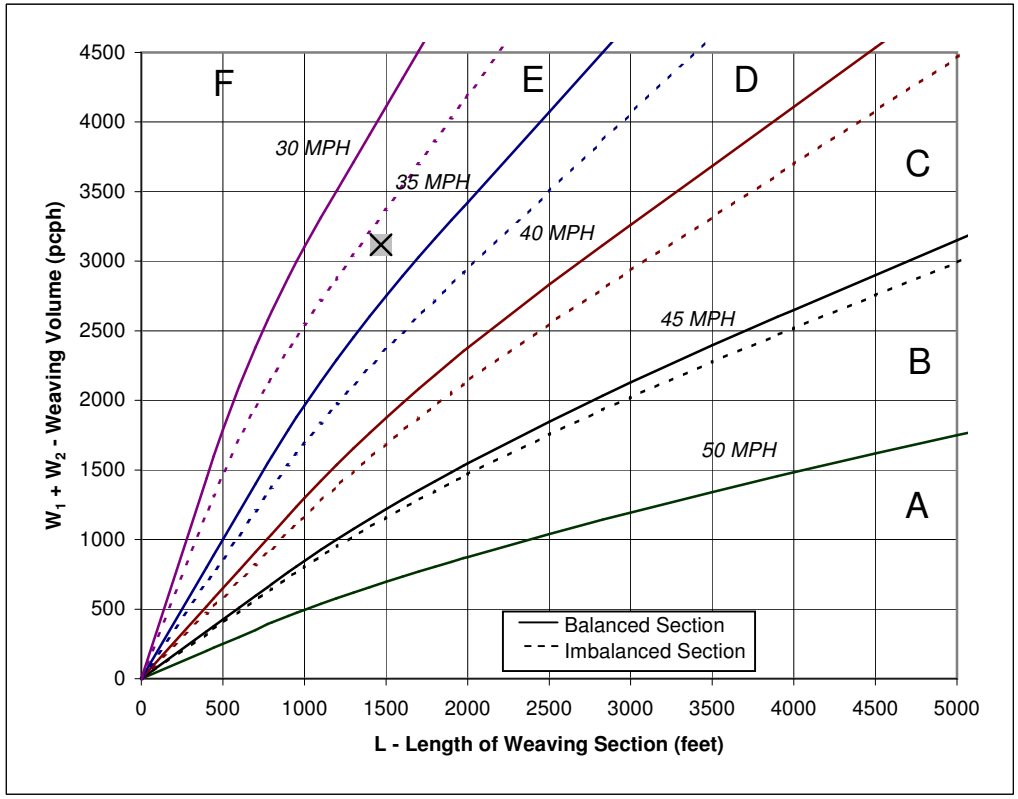
Data Input

Number of Entering Mainline Lanes	N_b	3
Number of Lanes in Weaving Section	N	4
Length of Weaving Section (feet)	L	1,470

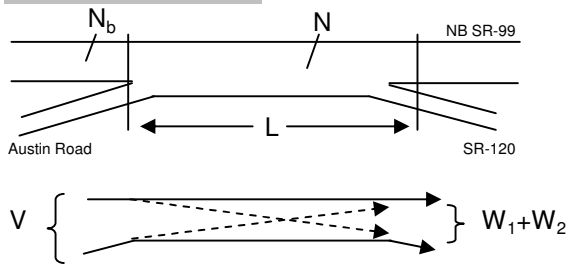
Project Information

Project	Union Crossing
Scenario	CUMULATIVE + PROJECT - PM
Freeway	NB SR-99
On-ramp	Austin Road
Off-ramp	SR-120

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,713	Volume (vph)*	119	Volume (vph)*	1,877
Truck Percentage	14%	Truck Percentage	6%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	6,610	Volume (pcph)	382	Volume (pcph)	2,736



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **32.6**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,844**
6. Level of Service (LOS) **E**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

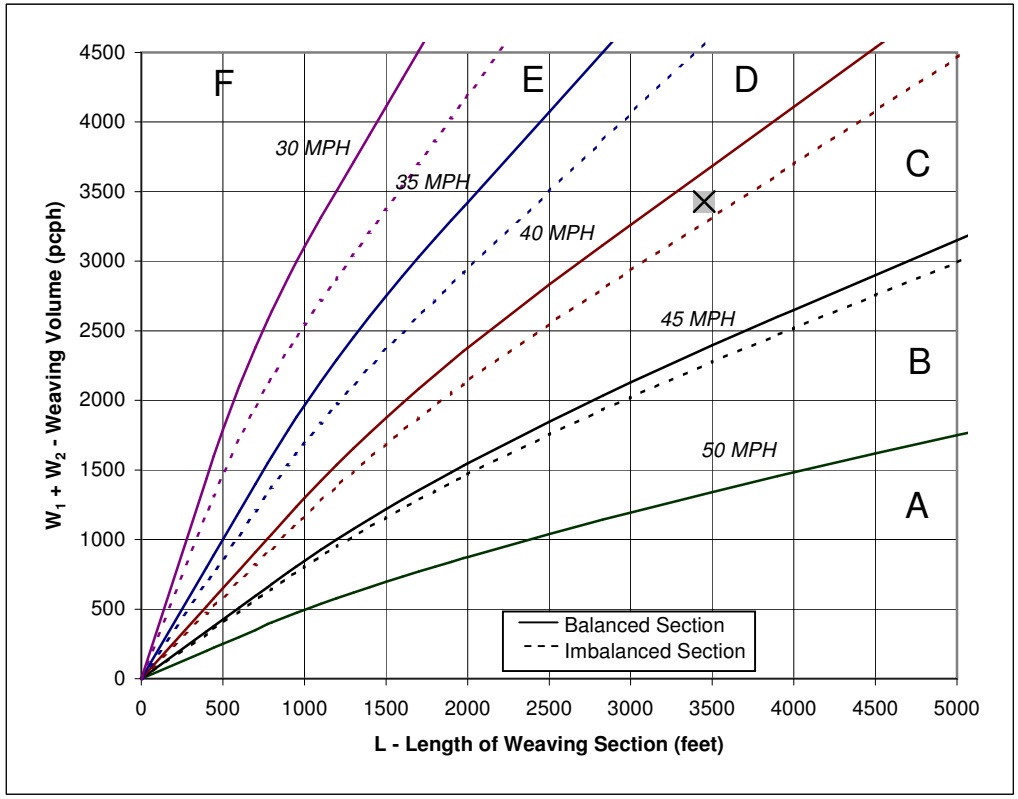
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	3,450

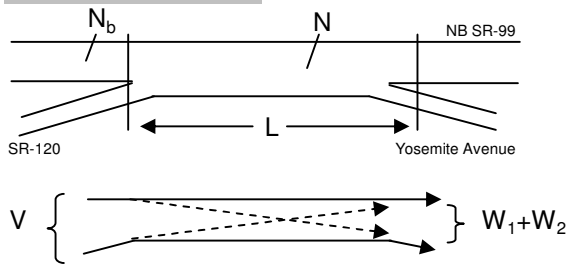
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,551	Volume (vph)*	715	Volume (vph)*	1,000
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	5,218	Volume (pcph)	1,365	Volume (pcph)	2,064

Project Information

Project	Union Crossing
Scenario	CUMULATIVE + PROJECT - PM
Freeway	NB SR-99
On-ramp	SR-120
Off-ramp	Yosemite Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 mph and **50 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **39.9**
4. Weaving Intensity Factor (k) **2.55**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,443**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

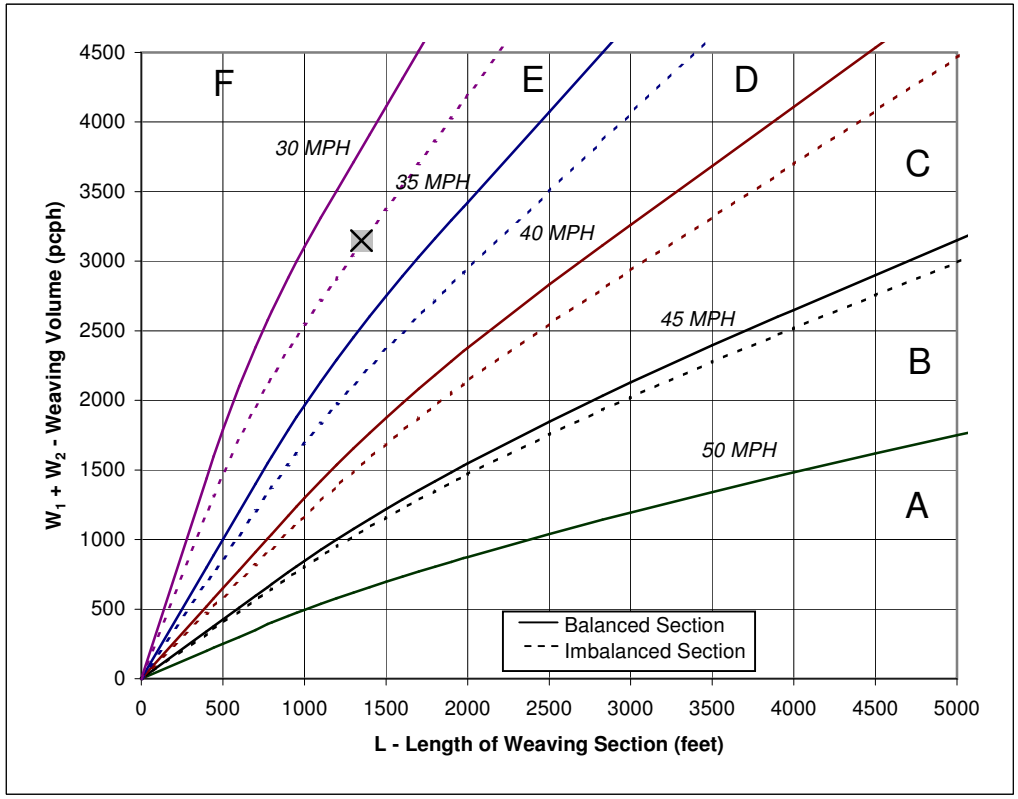
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

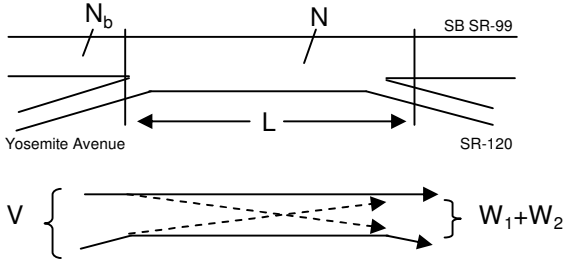
Project Information

Project	Union Crossing
Scenario	CUMULATIVE + PROJECT - PM
Freeway	SB SR-99
On-ramp	Yosemite Avenue
Off-ramp	SR-120

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,383	Volume (vph)*	777	Volume (vph)*	400
Truck Percentage	14%	Truck Percentage	10%	Truck Percentage	6%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	6,778	Volume (pcph)	1,489	Volume (pcph)	1,659



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **n**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 mph and **45 mph**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **23.4**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **3,252**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Project Access #19
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

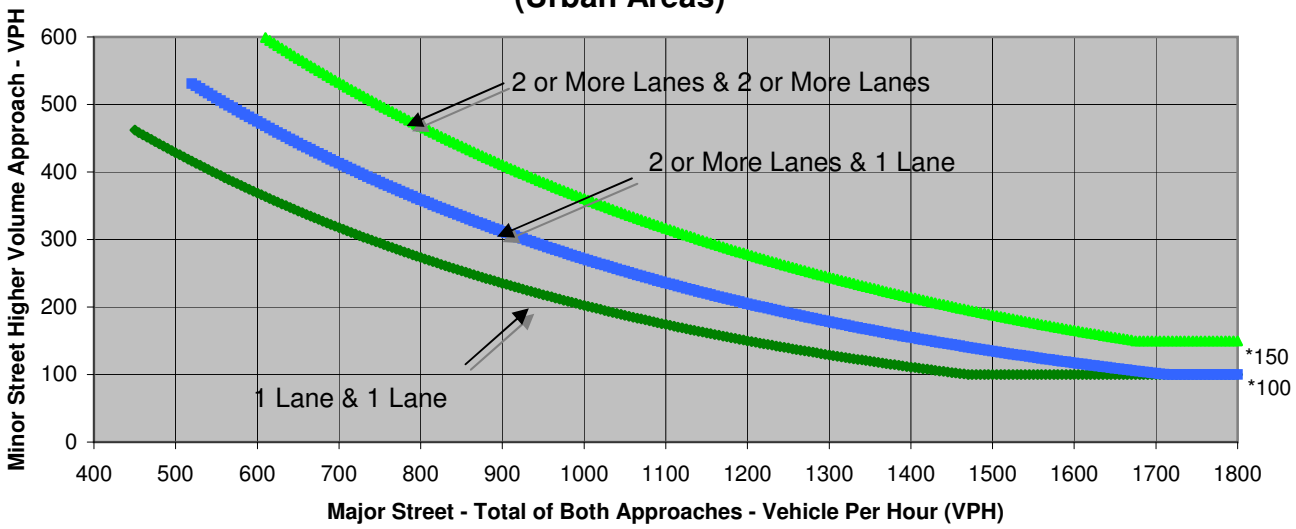
Turn Movement Volumes

	NB	SB	EB	WB
Left		0	0	0
Through		1,840	0	0
Right		271	109	0
Total	0	2,111	109	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Project Access #19	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	2,111	109	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Project Access
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

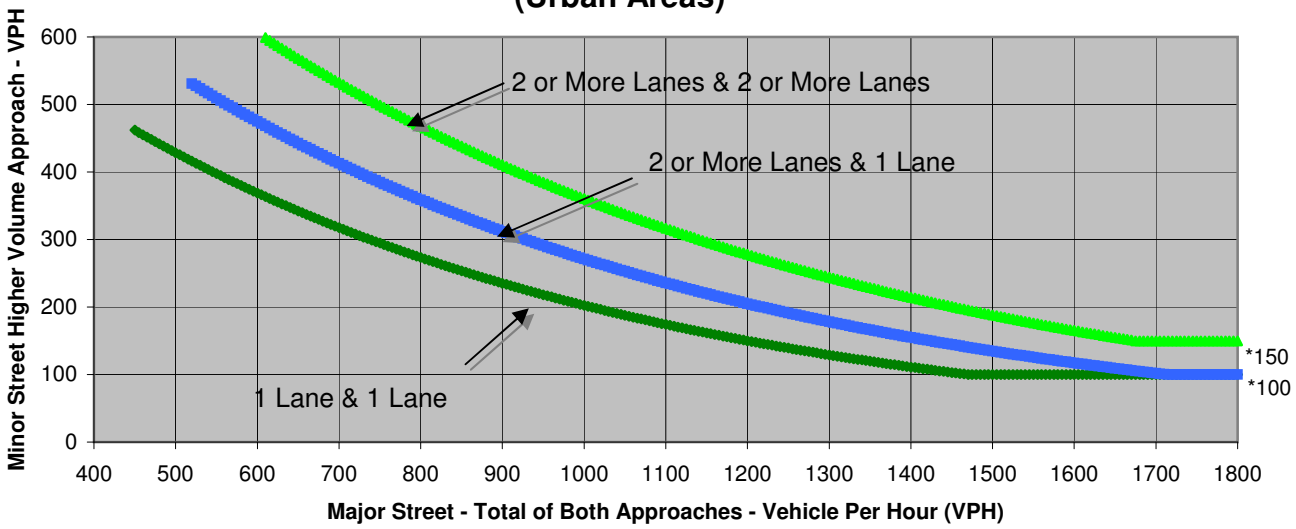
Turn Movement Volumes

	NB	SB	EB	WB
Left	41	0	91	0
Through	774	1,550	0	0
Right	0	60	14	0
Total	815	1,610	105	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Project Access	Warrant Met
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	2,425	105	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Atherton Drive
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

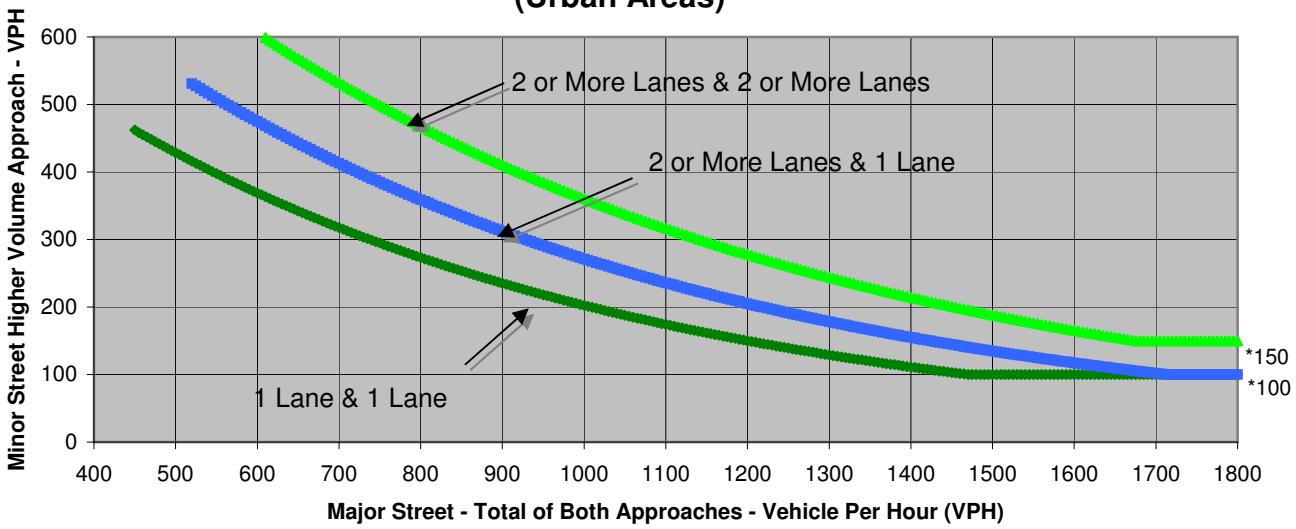
Turn Movement Volumes

	NB	SB	EB	WB
Left	59	790	730	162
Through	875	1,485	45	55
Right	152	560	38	625
Total	1,086	2,835	813	842

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Atherton Drive	Warrant Met
Number of Approach Lanes	3	3	YES
Traffic Volume (VPH) *	3,921	842	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Wawona Street
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

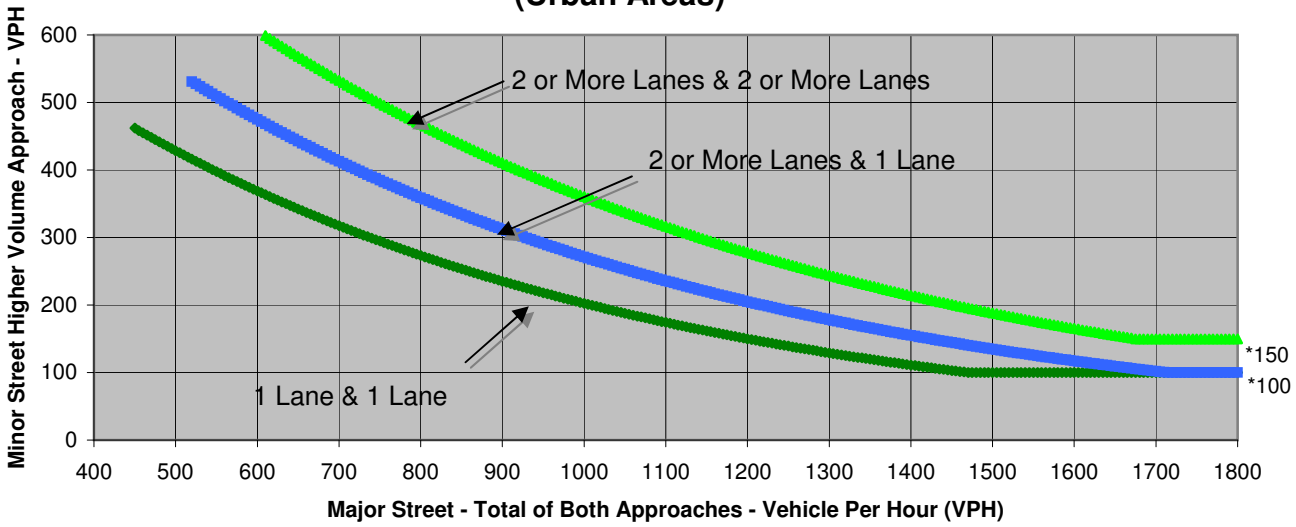
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	80	0	110
Through	1,651	1,020	0	0
Right	350	0	0	40
Total	2,001	1,100	0	150

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Airport Way	Minor Street Wawona Street	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	3,101	150	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Airport Way
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

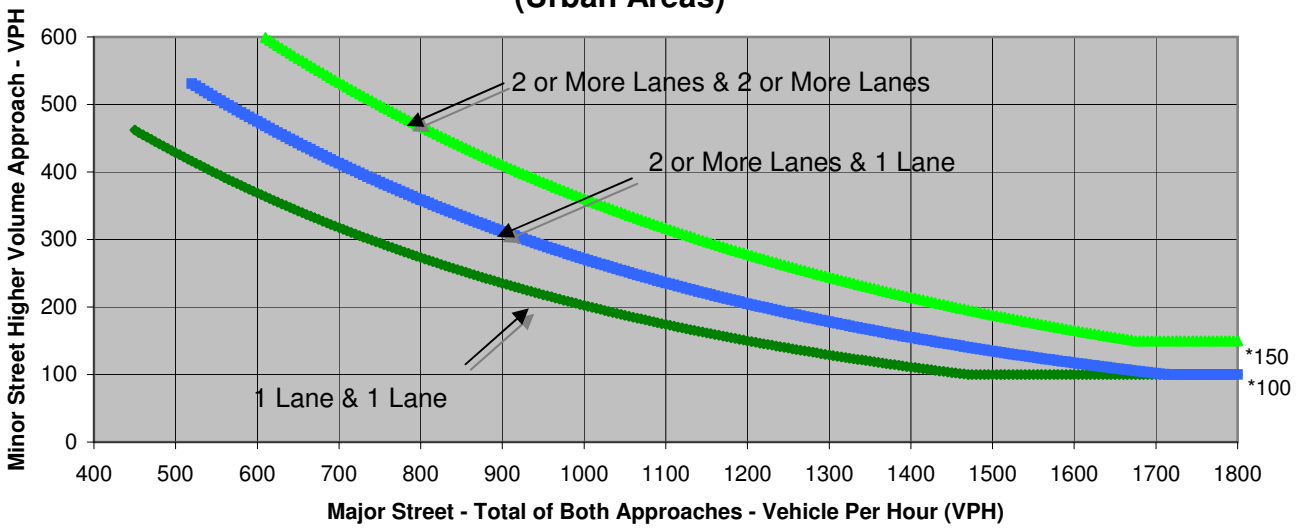
Turn Movement Volumes

	NB	SB	EB	WB
Left	40	530	74	480
Through	310	1,030	420	493
Right	53	125	296	30
Total	403	1,685	790	1,003

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,088	1,003	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Atherton Drive
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

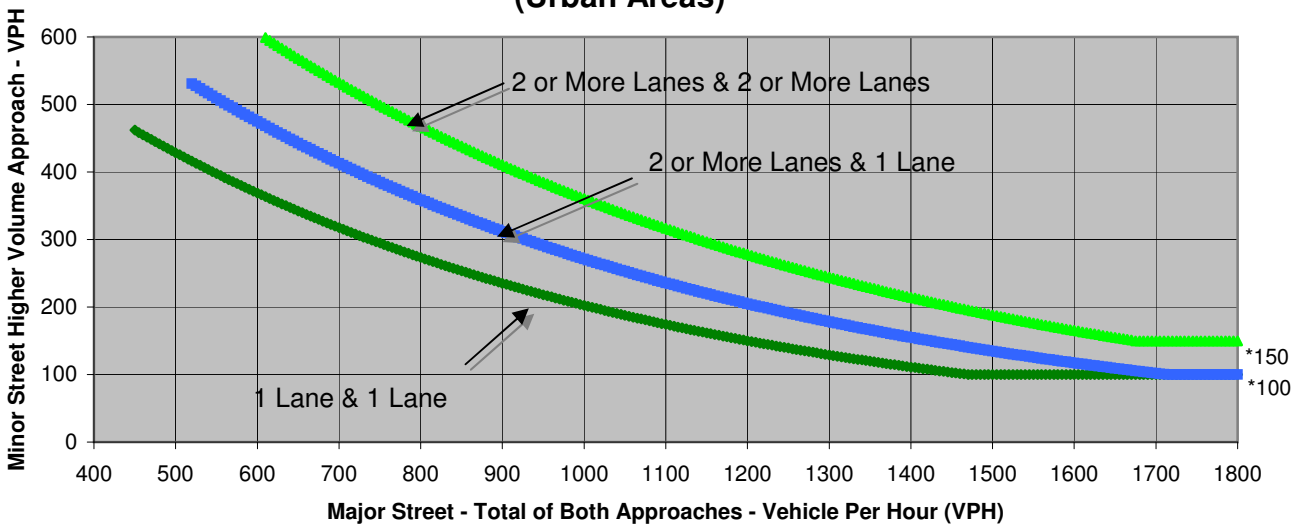
Turn Movement Volumes

	NB	SB	EB	WB
Left	170	0	560	
Through	630	1,660	0	
Right	0	480	280	
Total	800	2,140	840	0

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Atherton Drive	
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	2,940	840	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Main Street
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

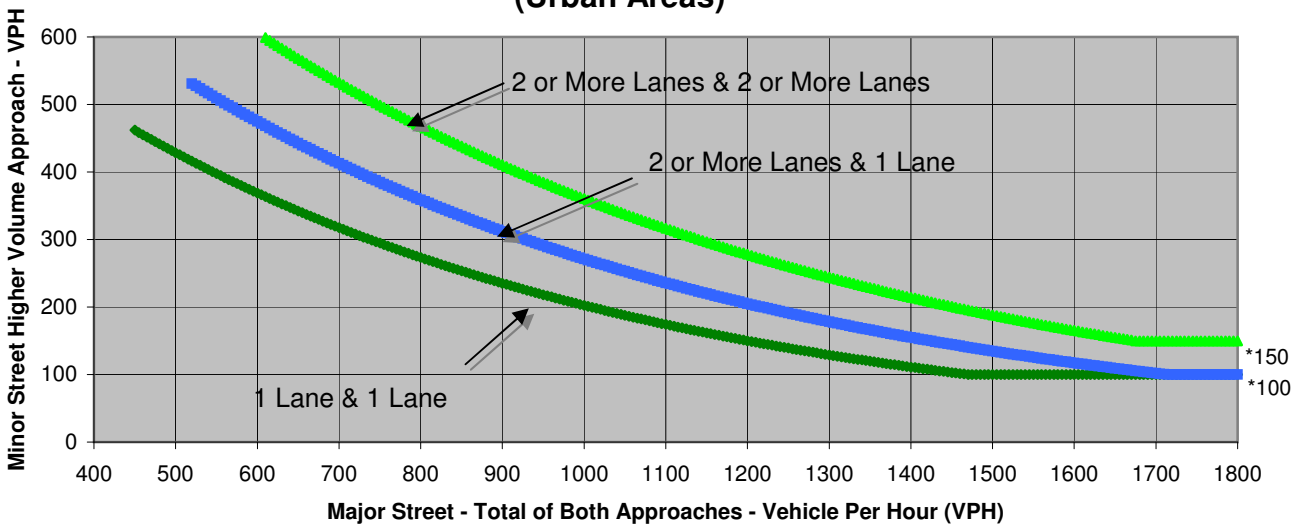
Turn Movement Volumes

	NB	SB	EB	WB
Left	83	920	100	150
Through	310	630	310	431
Right	80	390	340	130
Total	473	1,940	750	711

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Main Street	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	2,413	750	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Project Union Crossing
Scenario Cumulative Plus Project
Peak Hour PM

Major Street Union Road
Minor Street Daniels Street

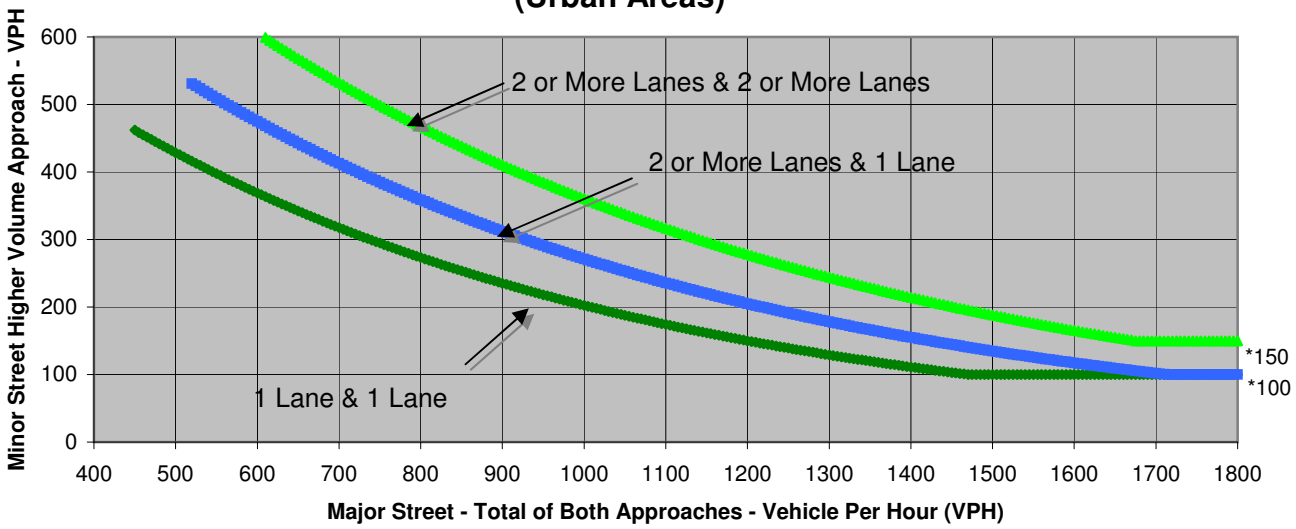
Turn Movement Volumes

	NB	SB	EB	WB
Left	175	0	40	0
Through	1,585	1,163	0	0
Right	0	40	138	0
Total	1,760	1,203	178	0

Major Street Direction

x North/South
East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Union Road	Minor Street Daniels Street	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,963	178	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Sheet No 1 of ?

Major Street	Union Road
Minor Street	Woodward Avenue
Project	Union Crossing
Scenario	Cumulative Plus Project
Peak Hour	PM

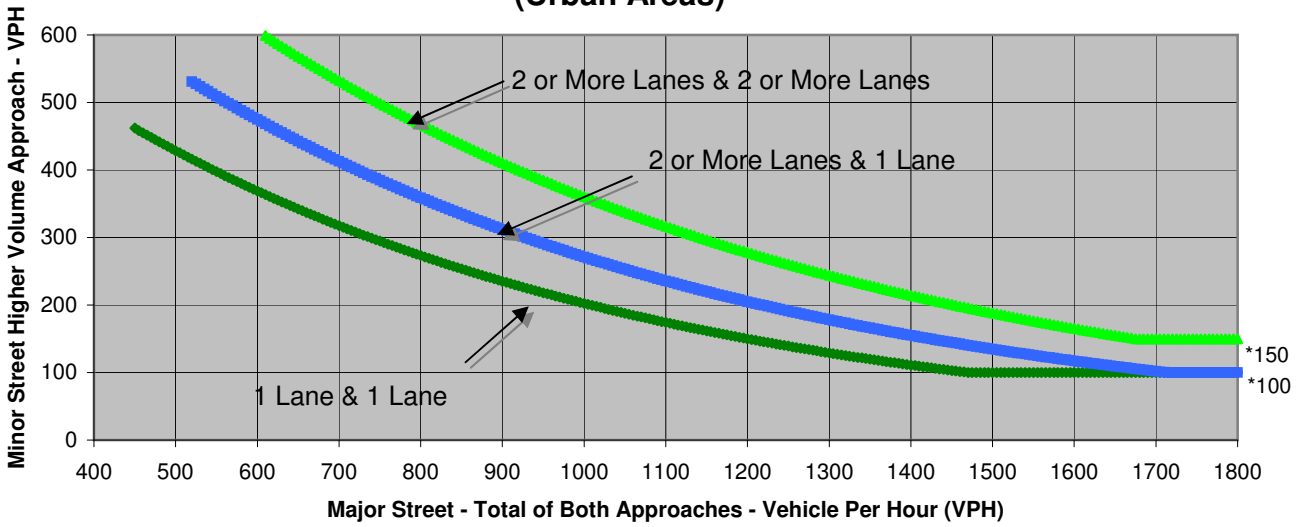
Turn Movement Volumes

	NB	SB	EB	WB
Left	136	280	213	20
Through	428	916	440	340
Right	20	337	260	174
Total	584	1,533	913	534

Major Street Direction

x	North/South
	East/West

Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)

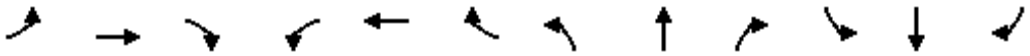


* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	2	2	YES
Traffic Volume (VPH) *	2,117	913	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3355		1770	3281		1770	1827	1583	1770	1747	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3355		1770	3281		1770	1827	1583	1770	1747	
Volume (vph)	560	352	187	275	352	334	222	1189	280	283	638	320
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)	589	371	197	289	371	352	234	1252	295	298	672	337
RTOR Reduction (vph)	0	65	0	0	159	0	0	0	51	0	16	0
Lane Group Flow (vph)	589	503	0	289	564	0	234	1252	244	298	993	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	11.0	19.7		18.0	26.7		15.0	31.9	31.9	22.1	39.0	
Effective Green, g (s)	11.0	19.7		18.0	26.7		15.0	31.9	31.9	22.1	39.0	
Actuated g/C Ratio	0.10	0.18		0.17	0.25		0.14	0.30	0.30	0.21	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	181	614		296	813		247	541	469	363	633	
v/s Ratio Prot	c0.33	c0.15		c0.16	0.17		c0.13	c0.69		0.17	c0.57	
v/s Ratio Perm									0.15			
v/c Ratio	3.25	0.82		0.98	0.69		0.95	2.31	0.52	0.82	1.57	
Uniform Delay, d1	48.4	42.3		44.6	36.8		46.0	37.9	31.5	40.9	34.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1028.5	8.4		45.4	2.6		42.5	597.2	4.1	13.8	263.6	
Delay (s)	1076.9	50.7		90.0	39.4		88.4	635.1	35.6	54.7	297.9	
Level of Service	F	D		F	D		F	F	D	D	F	
Approach Delay (s)		573.1			53.8			464.0			242.5	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	354.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.74		
Actuated Cycle Length (s)	107.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	143.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

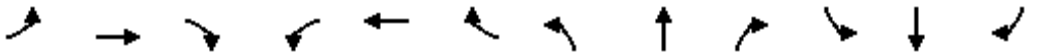
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	110	40	1651	350	80	1020
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	116	42	1738	368	84	1074
Pedestrians	2					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1313			
pX, platoon unblocked	0.57	0.57			0.57	
vC, conflicting volume	3166	1926			2108	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4800	2624			2944	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	0			0	
cM capacity (veh/h)	0	18			69	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	158	2106	1158
Volume Left	116	0	84
Volume Right	42	368	0
cSH	0	1700	69
Volume to Capacity	Err	1.24	1.22
Queue Length 95th (ft)	Err	0	166
Control Delay (s)	Err	0.0	735.5
Lane LOS	F		F
Approach Delay (s)	Err	0.0	735.5
Approach LOS	F		

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	135.2%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1562	3433	1863	1561	3433	3471	1545	1770	3471	1561
Volume (vph)	440	54	674	480	34	150	340	1411	370	80	920	130
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)	463	57	709	505	36	158	358	1485	389	84	968	137
RTOR Reduction (vph)	0	0	117	0	0	75	0	0	120	0	0	89
Lane Group Flow (vph)	463	57	592	505	36	83	358	1485	269	84	968	48
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.0	40.0	40.0	14.0	41.0	41.0	13.0	44.0	44.0	6.0	37.0	37.0
Effective Green, g (s)	13.0	40.0	40.0	14.0	41.0	41.0	13.0	44.0	44.0	6.0	37.0	37.0
Actuated g/C Ratio	0.11	0.33	0.33	0.12	0.34	0.34	0.11	0.37	0.37	0.05	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	372	621	521	401	637	533	372	1273	567	89	1070	481
v/s Ratio Prot	0.13	0.03		c0.15	0.02		c0.10	c0.43		0.05	0.28	
v/s Ratio Perm			c0.38			0.05			0.17			0.03
v/c Ratio	1.24	0.09	1.14	1.26	0.06	0.16	0.96	1.17	0.47	0.94	0.90	0.10
Uniform Delay, d1	53.5	27.5	40.0	53.0	26.5	27.5	53.3	38.0	29.1	56.8	39.8	29.6
Progression Factor	1.00	1.00	1.00	1.00	1.02	1.04	1.02	1.08	1.23	1.00	1.00	1.00
Incremental Delay, d2	130.8	0.1	82.5	135.2	0.0	0.1	7.3	75.8	0.3	76.4	12.4	0.4
Delay (s)	184.3	27.6	122.5	188.2	27.0	28.6	61.4	116.9	36.1	133.2	52.2	30.0
Level of Service	F	C	F	F	C	C	E	F	D	F	D	C
Approach Delay (s)		141.4			143.8			93.9			55.4	
Approach LOS		F			F			F			E	

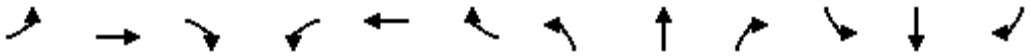
Intersection Summary			
HCM Average Control Delay	102.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1770	1495	1770	1759			1759	1495
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1770	1495	1770	1759			1759	1495
Volume (vph)	0	0	0	835	0	511	440	1610	0	0	1314	760
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	0	0	879	0	538	463	1695	0	0	1383	800
RTOR Reduction (vph)	0	0	0	0	0	20	0	0	0	0	0	191
Lane Group Flow (vph)	0	0	0	0	879	518	463	1695	0	0	1383	609
Heavy Vehicles (%)	0%	2%	2%	2%	2%	8%	2%	8%	2%	2%	8%	8%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					36.0	36.0	18.0	76.0			54.0	54.0
Effective Green, g (s)					36.0	36.0	18.0	76.0			54.0	54.0
Actuated g/C Ratio					0.30	0.30	0.15	0.63			0.45	0.45
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					531	449	266	1114			792	673
v/s Ratio Prot							c0.26	0.96			c0.79	
v/s Ratio Perm					0.50	0.35						0.41
v/c Ratio					1.66	1.15	1.74	1.52			1.75	0.91
Uniform Delay, d1					42.0	42.0	51.0	22.0			33.0	30.6
Progression Factor					1.00	1.00	1.63	1.35			0.77	0.67
Incremental Delay, d2					303.2	91.6	334.7	235.1			336.3	2.2
Delay (s)					345.2	133.6	417.8	264.9			361.6	22.6
Level of Service					F	F	F	F			F	C
Approach Delay (s)		0.0			264.9			297.7			237.3	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM Average Control Delay	266.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	167.5%	ICU Level of Service	H
Analysis Period (min)	15		

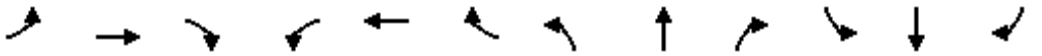
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1671	1583					1863	1583	1671	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1671	1583					1863	1583	1671	1863	
Volume (vph)	810	0	1250	0	0	0	0	1240	990	564	1585	0
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)	853	0	1316	0	0	0	0	1305	1042	594	1668	0
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	311	0	0	0
Lane Group Flow (vph)	0	853	1306	0	0	0	0	1305	731	594	1668	0
Heavy Vehicles (%)	8%	2%	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		47.0	47.0					42.0	42.0	19.0	65.0	
Effective Green, g (s)		47.0	47.0					42.0	42.0	19.0	65.0	
Actuated g/C Ratio		0.39	0.39					0.35	0.35	0.16	0.54	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		654	620					652	554	265	1009	
v/s Ratio Prot								c0.70		c0.36	0.90	
v/s Ratio Perm		0.51	c0.83						0.46			
v/c Ratio		1.30	2.11					2.00	1.32	2.24	1.65	
Uniform Delay, d1		36.5	36.5					39.0	39.0	50.5	27.5	
Progression Factor		1.00	1.00					1.00	1.00	0.95	1.50	
Incremental Delay, d2		147.9	503.6					456.1	155.9	559.8	294.3	
Delay (s)		184.4	540.1					495.1	194.9	607.7	335.7	
Level of Service		F	F					F	F	F	F	
Approach Delay (s)		400.2			0.0			361.8			407.1	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM Average Control Delay	389.2	HCM Level of Service	F
HCM Volume to Capacity ratio	2.09		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	167.5%	ICU Level of Service	H
Analysis Period (min)	15		

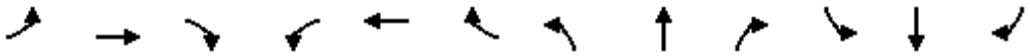
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	730	45	38	162	55	625	59	875	152	790	1485	560
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	768	47	40	171	58	658	62	921	160	832	1563	589
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			14			14						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											720	
pX, platoon unblocked	0.48	0.48	0.48	0.48	0.48		0.48					
vC, conflicting volume	4629	4432	1563	4315	4861	921	2153			1081		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8591	8178	2178	7934	9076	921	3411			1081		
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	0	0	0	0	0	0			0		
cM capacity (veh/h)	0	0	28	0	0	328	37			645		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	856	171	716	62	921	160	832	1563	589
Volume Left	768	171	0	62	0	0	832	0	0
Volume Right	40	0	658	0	0	160	0	0	589
cSH	0	0	0	37	1700	1700	645	1700	1700
Volume to Capacity	Err	Err	Err	1.66	0.54	0.09	1.29	0.92	0.35
Queue Length 95th (ft)	Err	Err	Err	165	0	0	820	0	0
Control Delay (s)	Err	Err	Err	554.7	0.0	0.0	162.0	0.0	0.0
Lane LOS	F	F	F	F			F		
Approach Delay (s)	Err	Err		30.1			45.1		
Approach LOS	F	F							

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	149.3%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	480	493	30	74	420	296	40	310	53	530	1030	125
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	505	519	32	78	442	312	42	326	56	558	1084	132

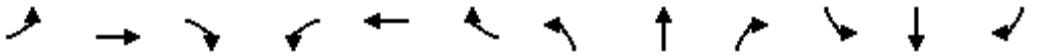
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	1056	832	424	1774
Volume Left (vph)	505	78	42	558
Volume Right (vph)	32	312	56	132
Hadj (s)	0.11	-0.17	-0.03	0.05
Departure Headway (s)	9.7	9.4	9.5	9.6
Degree Utilization, x	2.84	2.17	1.12	4.74
Capacity (veh/h)	383	390	389	380
Control Delay (s)	854.3	555.7	115.3	1706.8
Approach Delay (s)	854.3	555.7	115.3	1706.8
Approach LOS	F	F	F	F

Intersection Summary			
Delay	1086.9		
HCM Level of Service	F		
Intersection Capacity Utilization	224.8%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3444		1770	3281		1770	3398	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3444		1770	3281		1770	3398	
Volume (vph)	290	520	310	201	550	120	291	640	153	130	633	230
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)	305	547	326	212	579	126	306	674	161	137	666	242
RTOR Reduction (vph)	0	0	208	0	23	0	0	26	0	0	46	0
Lane Group Flow (vph)	305	547	118	212	682	0	306	809	0	137	862	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.0	24.0	24.0	6.0	20.0		13.0	26.0		8.0	21.0	
Effective Green, g (s)	10.0	24.0	24.0	6.0	20.0		13.0	26.0		8.0	21.0	
Actuated g/C Ratio	0.12	0.30	0.30	0.08	0.25		0.16	0.32		0.10	0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	221	559	475	133	861		288	1066		177	892	
v/s Ratio Prot	c0.17	c0.29		0.12	0.20		c0.17	0.25		0.08	c0.25	
v/s Ratio Perm			0.07									
v/c Ratio	1.38	0.98	0.25	1.59	0.79		1.06	0.76		0.77	0.97	
Uniform Delay, d1	35.0	27.7	21.2	37.0	28.1		33.5	24.2		35.1	29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	196.7	32.2	0.3	299.7	5.0		70.5	5.1		18.8	22.9	
Delay (s)	231.7	60.0	21.5	336.7	33.1		104.0	29.3		53.9	52.1	
Level of Service	F	E	C	F	C		F	C		D	D	
Approach Delay (s)		93.8			103.3			49.3			52.3	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM Average Control Delay	73.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		

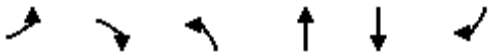
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.92		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1707		1770	1705		1770	3283		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1707		1770	1705		1770	3283		1770	1863	1583
Volume (vph)	110	100	125	128	100	130	214	1040	238	160	880	110
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)	116	105	132	135	105	137	225	1095	251	168	926	116
RTOR Reduction (vph)	0	73	0	0	74	0	0	27	0	0	0	72
Lane Group Flow (vph)	116	164	0	135	168	0	225	1319	0	168	926	44
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	4.7	12.2		6.0	13.5		6.0	20.2		8.0	22.2	4.7
Effective Green, g (s)	4.7	12.2		6.0	13.5		6.0	20.2		8.0	22.2	4.7
Actuated g/C Ratio	0.08	0.20		0.10	0.22		0.10	0.32		0.13	0.36	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	133	334		170	369		170	1063		227	663	119
v/s Ratio Prot	0.07	0.10		c0.08	c0.10		c0.13	0.40		0.09	c0.50	0.03
v/s Ratio Perm												
v/c Ratio	0.87	0.49		0.79	0.46		1.32	1.24		0.74	1.40	0.37
Uniform Delay, d1	28.6	22.3		27.6	21.3		28.2	21.1		26.2	20.1	27.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	42.2	1.1		22.0	0.9		180.5	116.5		12.2	187.6	1.9
Delay (s)	70.7	23.5		49.6	22.2		208.7	137.6		38.4	207.7	29.4
Level of Service	E	C		D	C		F	F		D	F	C
Approach Delay (s)		39.0			32.0			147.8			167.1	
Approach LOS		D			C			F			F	

Intersection Summary			
HCM Average Control Delay	131.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	62.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

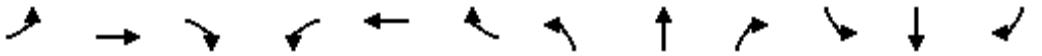
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	40	138	175	1585	1163	40
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	145	184	1668	1224	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				306		
pX, platoon unblocked	0.29					
vC, conflicting volume	3282	1245	1266			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8888	1245	1266			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	32	66			
cM capacity (veh/h)	0	212	549			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	187	1853	1266
Volume Left	42	184	0
Volume Right	145	0	42
cSH	0	549	1700
Volume to Capacity	Err	0.34	0.74
Queue Length 95th (ft)	Err	37	0
Control Delay (s)	Err	242.9	0.0
Lane LOS	F	F	
Approach Delay (s)	Err	242.9	0.0
Approach LOS	F		

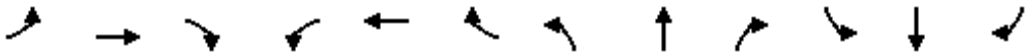
Intersection Summary			
Average Delay	702.8		
Intersection Capacity Utilization	177.4%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1671	1583	1770	1759			1863	1583
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1671	1583	1770	1759			1863	1583
Volume (vph)	0	0	0	323	0	440	600	1320	0	0	991	310
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	0	0	340	0	463	632	1389	0	0	1043	326
RTOR Reduction (vph)	0	0	0	0	0	65	0	0	0	0	0	103
Lane Group Flow (vph)	0	0	0	0	340	398	632	1389	0	0	1043	223
Heavy Vehicles (%)	2%	2%	2%	8%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					26.0	26.0	28.0	86.0			54.0	54.0
Effective Green, g (s)					26.0	26.0	28.0	86.0			54.0	54.0
Actuated g/C Ratio					0.22	0.22	0.23	0.72			0.45	0.45
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					362	343	413	1261			838	712
v/s Ratio Prot							c0.36	0.79			c0.56	
v/s Ratio Perm					0.20	c0.25						0.14
v/c Ratio					0.94	1.16	1.53	1.10			1.24	0.31
Uniform Delay, d1					46.2	47.0	46.0	17.0			33.0	21.1
Progression Factor					1.00	1.00	0.56	0.36			1.00	1.00
Incremental Delay, d2					31.6	99.6	239.7	47.0			120.1	1.1
Delay (s)					77.9	146.6	265.6	53.1			153.1	22.3
Level of Service					E	F	F	D			F	C
Approach Delay (s)		0.0			117.5			119.5			121.9	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM Average Control Delay	119.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	129.4%	ICU Level of Service	H
Analysis Period (min)	15		

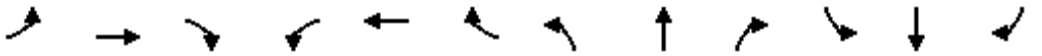
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1495					1759	1495	1770	1863	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1495					1759	1495	1770	1863	
Volume (vph)	610	0	1108	0	0	0	0	1310	307	300	1014	0
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)	642	0	1166	0	0	0	0	1379	323	316	1067	0
RTOR Reduction (vph)	0	0	57	0	0	0	0	0	77	0	0	0
Lane Group Flow (vph)	0	642	1109	0	0	0	0	1379	246	316	1067	0
Heavy Vehicles (%)	2%	2%	8%	2%	2%	2%	2%	8%	8%	2%	2%	8%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		44.0	44.0					48.0	48.0	16.0	68.0	
Effective Green, g (s)		44.0	44.0					48.0	48.0	16.0	68.0	
Actuated g/C Ratio		0.37	0.37					0.40	0.40	0.13	0.57	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		649	548					704	598	236	1056	
v/s Ratio Prot								c0.78		c0.18	0.57	
v/s Ratio Perm		0.36	c0.74						0.16			
v/c Ratio		0.99	2.02					1.96	0.41	1.34	1.01	
Uniform Delay, d1		37.8	38.0					36.0	25.8	52.0	26.0	
Progression Factor		1.00	1.00					0.72	0.49	1.03	0.36	
Incremental Delay, d2		32.2	467.1					435.0	1.4	155.2	11.0	
Delay (s)		70.0	505.1					461.1	14.2	209.0	20.3	
Level of Service		E	F					F	B	F	C	
Approach Delay (s)		350.6			0.0			376.3			63.4	
Approach LOS		F			A			F			E	

Intersection Summary			
HCM Average Control Delay	278.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	129.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



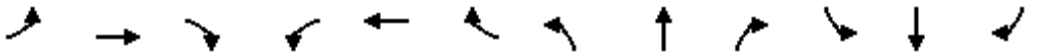
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	2787	3433	3539	2787	3433	3539	1583
Volume (vph)	669	35	143	303	26	520	211	517	137	475	1221	144
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)	704	37	151	319	27	547	222	544	144	500	1285	152
RTOR Reduction (vph)	0	0	125	0	0	506	0	0	88	0	0	57
Lane Group Flow (vph)	704	37	26	319	27	41	222	544	56	500	1285	95
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	27.0	20.6	20.6	15.3	8.9	8.9	12.1	46.5	46.5	21.6	56.0	56.0
Effective Green, g (s)	27.0	20.6	20.6	15.3	8.9	8.9	12.1	46.5	46.5	21.6	56.0	56.0
Actuated g/C Ratio	0.22	0.17	0.17	0.13	0.07	0.07	0.10	0.39	0.39	0.18	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	772	608	272	438	262	207	346	1371	1080	618	1652	739
v/s Ratio Prot	c0.21	0.01		0.09	0.01		0.06	0.15		c0.15	c0.36	
v/s Ratio Perm			0.02			c0.01			0.02			0.06
v/c Ratio	0.91	0.06	0.10	0.73	0.10	0.20	0.64	0.40	0.05	0.81	0.78	0.13
Uniform Delay, d1	45.3	41.6	41.9	50.4	51.8	52.2	51.9	26.6	23.0	47.2	26.8	18.2
Progression Factor	0.95	0.96	1.20	1.00	1.00	1.00	1.00	1.00	1.00	1.07	0.83	0.72
Incremental Delay, d2	11.9	0.0	0.1	6.0	0.2	0.5	4.0	0.9	0.1	0.7	0.3	0.0
Delay (s)	55.1	40.0	50.4	56.3	52.0	52.7	55.9	27.5	23.1	51.5	22.6	13.1
Level of Service	E	D	D	E	D	D	E	C	C	D	C	B
Approach Delay (s)		53.7			53.9			33.7			29.3	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	39.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection has too many lanes per leg.

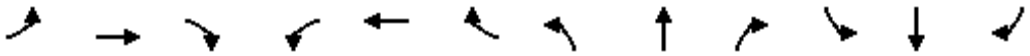
HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.



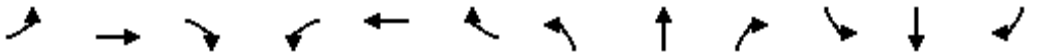
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1492	1736	1792			1792	1488
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1492	1736	1792			1792	1488
Volume (vph)	0	0	0	740	0	350	380	1511	0	0	740	802
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	0	0	779	0	368	400	1591	0	0	779	844
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	358
Lane Group Flow (vph)	0	0	0	0	779	368	400	1591	0	0	779	486
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					44.0	120.0	16.0	68.0			48.0	48.0
Effective Green, g (s)					44.0	120.0	16.0	68.0			48.0	48.0
Actuated g/C Ratio					0.37	1.00	0.13	0.57			0.40	0.40
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					637	1492	231	1015			717	595
v/s Ratio Prot					c0.45		c0.23	c0.89			0.43	
v/s Ratio Perm						0.25						0.33
v/c Ratio					1.22	0.25	1.73	1.57			1.09	0.82
Uniform Delay, d1					38.0	0.0	52.0	26.0			36.0	32.1
Progression Factor					1.00	1.00	0.36	0.33			1.00	1.00
Incremental Delay, d2					114.0	0.4	330.9	255.8			59.5	11.8
Delay (s)					152.0	0.4	349.6	264.5			95.5	43.9
Level of Service					F	A	F	F			F	D
Approach Delay (s)		0.0			103.3			281.6			68.7	
Approach LOS		A			F			F			E	

Intersection Summary			
HCM Average Control Delay	166.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	153.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98					0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.95		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1703	1518					1729		1703	1827	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1703	1518					1729		1703	1827	
Volume (vph)	1101	0	950	0	0	0	0	790	400	290	1190	0
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)	1159	0	1000	0	0	0	0	832	421	305	1253	0
RTOR Reduction (vph)	0	0	33	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	1159	967	0	0	0	0	1238	0	305	1253	0
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm							Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		45.0	45.0					50.0		13.0	67.0	
Effective Green, g (s)		45.0	45.0					50.0		13.0	67.0	
Actuated g/C Ratio		0.38	0.38					0.42		0.11	0.56	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		639	569					720		184	1020	
v/s Ratio Prot		c0.68						c0.72		c0.18	0.69	
v/s Ratio Perm			0.64									
v/c Ratio		1.81	1.70					1.72		1.66	1.23	
Uniform Delay, d1		37.5	37.5					35.0		53.5	26.5	
Progression Factor		1.00	1.00					1.00		1.46	1.19	
Incremental Delay, d2		372.4	322.2					329.5		298.1	103.6	
Delay (s)		409.9	359.7					364.5		376.2	135.3	
Level of Service		F	F					F		F	F	
Approach Delay (s)		386.6			0.0			364.5			182.5	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM Average Control Delay	317.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	153.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	560	0	280	0	0	0	170	630	0	0	1660	480
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	589	0	295	0	0	0	179	663	0	0	1747	505
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											640	
pX, platoon unblocked	0.45	0.45	0.45	0.45	0.45		0.45					
vC, conflicting volume	2768	2768	1747	3063	3274	663	2253			663		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4895	4895	2646	5544	6008	663	3759			663		
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	0	0	0	0	100	0			100		
cM capacity (veh/h)	0	0	14	0	0	461	26			926		

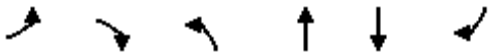
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	589	295	0	179	663	1747	505
Volume Left	589	0	0	179	0	0	0
Volume Right	0	295	0	0	0	0	505
cSH	0	14	1700	26	1700	1700	1700
Volume to Capacity	Err	21.66	0.00	6.98	0.39	1.03	0.30
Queue Length 95th (ft)	Err	Err	0	Err	0	0	0
Control Delay (s)	Err	Err	0.0	2991.1	0.0	0.0	0.0
Lane LOS	F	F	A	F			
Approach Delay (s)	Err		0.0	635.6		0.0	
Approach LOS	F		A				

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	137.8%	ICU Level of Service	H	
Analysis Period (min)	15			

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

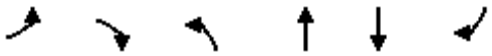
Channelized right turn lanes are not counted.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	0	1706	1840	271
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	1796	1937	285
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				370	489	
pX, platoon unblocked	0.89					
vC, conflicting volume	2977	1111	2222			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3096	1111	2222			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	8	204	231			

Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	898	898	1291	931
Volume Left	0	0	0	0
Volume Right	0	0	0	285
cSH	1700	1700	1700	1700
Volume to Capacity	0.53	0.53	0.76	0.55
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0		0.0	
Approach LOS				

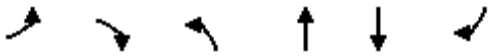
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	100	0	866	1511	155
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	105	0	912	1591	163
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					310	
pX, platoon unblocked	0.69	0.69	0.69			
vC, conflicting volume	2128	877	1754			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2185	371	1643			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	76	100			
cM capacity (veh/h)	27	432	269			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	105	456	456	1060	693
Volume Left	0	0	0	0	0
Volume Right	105	0	0	0	163
cSH	432	1700	1700	1700	1700
Volume to Capacity	0.24	0.27	0.27	0.62	0.41
Queue Length 95th (ft)	24	0	0	0	0
Control Delay (s)	16.0	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	16.0	0.0		0.0	
Approach LOS	C				

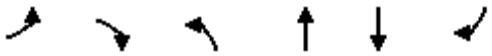
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	91	14	41	774	1550	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	96	15	43	815	1632	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					530	
pX, platoon unblocked	0.70	0.70	0.70			
vC, conflicting volume	2157	847	1695			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2224	350	1563			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	97	85			
cM capacity (veh/h)	22	451	293			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	96	15	43	407	407	1088	607
Volume Left	96	0	43	0	0	0	0
Volume Right	0	15	0	0	0	0	63
cSH	22	451	293	1700	1700	1700	1700
Volume to Capacity	4.39	0.03	0.15	0.24	0.24	0.64	0.36
Queue Length 95th (ft)	Err	3	13	0	0	0	0
Control Delay (s)	Err	13.2	19.4	0.0	0.0	0.0	0.0
Lane LOS	F	B	C				
Approach Delay (s)	8667.6		1.0			0.0	
Approach LOS	F						

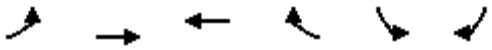
Intersection Summary			
Average Delay	360.0		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	14	0	816	1519	46
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	15	0	859	1599	48
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					720	
pX, platoon unblocked	0.71	0.71	0.71			
vC, conflicting volume	2053	824	1647			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2075	334	1501			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	100			
cM capacity (veh/h)	33	467	313			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	15	429	429	1066	581
Volume Left	0	0	0	0	0
Volume Right	15	0	0	0	48
cSH	467	1700	1700	1700	1700
Volume to Capacity	0.03	0.25	0.25	0.63	0.34
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	13.0	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	13.0	0.0		0.0	
Approach LOS	B				

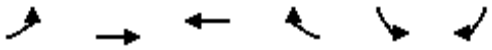
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	910	769	35	0	12
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	958	809	37	0	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	846				1307	423
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	846				1307	423
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	786				151	579

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	479	479	540	307	13
Volume Left	0	0	0	0	0
Volume Right	0	0	0	37	13
cSH	1700	1700	1700	1700	579
Volume to Capacity	0.28	0.28	0.32	0.18	0.02
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	0.0	0.0	0.0	11.4
Lane LOS					B
Approach Delay (s)	0.0		0.0		11.4
Approach LOS					B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	0	30	54	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	32	57	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			451			
pX, platoon unblocked						
vC, conflicting volume	32				16	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32				16	16
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	100
cM capacity (veh/h)	1579				1000	1060

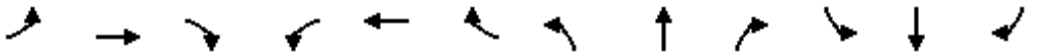
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	0	0	0	32	57	0
Volume Left	0	0	0	0	57	0
Volume Right	0	0	0	32	0	0
cSH	1700	1700	1700	1700	1000	1700
Volume to Capacity	0.00	0.00	0.00	0.02	0.06	0.00
Queue Length 95th (ft)	0	0	0	0	5	0
Control Delay (s)	0.0	0.0	0.0	0.0	8.8	0.0
Lane LOS					A	A
Approach Delay (s)	0.0		0.0		8.8	
Approach LOS					A	

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	54	0	17	30	42	0	0	13	100	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	57	0	18	32	44	0	0	14	105	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	76			57			108	168	28	132	146	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	76			57			108	168	28	132	146	38
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	87	100	100
cM capacity (veh/h)	1521			1546			851	715	1040	809	735	1026

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	28	28	18	21	55	14	105	0
Volume Left	0	0	18	0	0	0	105	0
Volume Right	0	0	0	0	44	14	0	0
cSH	1700	1700	1546	1700	1700	1040	809	1700
Volume to Capacity	0.02	0.02	0.01	0.01	0.03	0.01	0.13	0.00
Queue Length 95th (ft)	0	0	1	0	0	1	11	0
Control Delay (s)	0.0	0.0	7.4	0.0	0.0	8.5	10.1	0.0
Lane LOS			A			A	B	A
Approach Delay (s)	0.0		1.4			8.5	10.1	
Approach LOS						A	B	

Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	22.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95		0.97	0.95			1.00	1.00		1.00	
Frt		1.00		1.00	0.90			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.96	
Satd. Flow (prot)		3539		3433	3198			1863	1583		1793	
Flt Permitted		1.00		0.95	1.00			1.00	1.00		0.70	
Satd. Flow (perm)		3539		3433	3198			1863	1583		1303	
Volume (vph)	0	167	0	135	88	159	0	107	294	386	109	0
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	176	0	142	93	167	0	113	309	406	115	0
RTOR Reduction (vph)	0	0	0	0	132	0	0	0	254	0	0	0
Lane Group Flow (vph)	0	176	0	142	128	0	0	113	55	0	521	0
Turn Type	Prot			Prot			Split		Perm	Perm		Perm
Protected Phases	7	4		3	8		2	2			6	
Permitted Phases									2	6		6
Actuated Green, G (s)		11.5		9.3	24.8			21.2	21.2		62.0	
Effective Green, g (s)		11.5		9.3	24.8			21.2	21.2		62.0	
Actuated g/C Ratio		0.10		0.08	0.21			0.18	0.18		0.52	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		339		266	661			329	280		673	
v/s Ratio Prot		c0.05		c0.04	0.04			c0.06				
v/s Ratio Perm									0.03		c0.40	
v/c Ratio		0.52		0.53	0.19			0.34	0.19		0.77	
Uniform Delay, d1		51.6		53.3	39.3			43.3	42.1		23.4	
Progression Factor		1.00		0.55	0.13			1.00	1.00		1.00	
Incremental Delay, d2		1.3		1.9	0.1			2.8	1.6		8.5	
Delay (s)		53.0		31.2	5.3			46.1	43.7		31.8	
Level of Service		D		C	A			D	D		C	
Approach Delay (s)		53.0			14.4			44.3			31.8	
Approach LOS		D			B			D			C	

Intersection Summary			
HCM Average Control Delay	33.1	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	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #14

Cycle (sec): 100 | Critical Vol./Cap.(X): 3.366
Loss Time (sec): 0 (Y+R=4.0 sec) | Average Delay (sec/veh): 413.9
Optimal Cycle: 0 | Level Of Service: F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	110	350	20	205	905	265	145	440	260	20	340	105
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	110	350	20	205	905	265	145	440	260	20	340	105
Added Vol:	0	104	0	71	113	60	65	0	0	0	0	65
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	110	454	20	276	1018	325	210	440	260	20	340	170
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	110	454	20	276	1018	325	210	440	260	20	340	170
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	454	20	276	1018	325	210	440	260	20	340	170
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	110	454	20	276	1018	325	210	440	260	20	340	170
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	273	284	300	291	302	322	282	294	312	273	284	301
Capacity Analysis Module:												
Vol/Sat:	0.40	1.60	0.07	0.95	3.37	1.01	0.74	1.50	0.83	0.07	1.20	0.57
Crit Moves:		****			****			****			****	
Delay/Veh:	24.5	315	15.5	77.3	1093	87.3	44.8	270	52.5	16.9	153	29.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	24.5	315	15.5	77.3	1093	87.3	44.8	270	52.5	16.9	153	29.1
LOS by Move:	C	F	C	F	F	F	E	F	F	C	F	D
ApproachDel:	249.9			718.1			156.1			107.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	249.9			718.1			156.1			107.9		
LOS by Appr:	F			F			F			F		
AllWayAvgQ:	0.7	23.6	0.1	5.0	90.6	6.6	2.3	20.8	3.3	0.1	10.8	1.2

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

Intersection #14

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0000			0.0000			0.0000			0.0000		
P[C5]:	1.0000			1.0000			1.0000			1.0000		
Padj[C1]:	0.04000			0.04000			0.04000			0.04000		
Padj[C2]:	0.03000			0.03000			0.03000			0.03000		
Padj[C3]:	0.02000			0.02000			0.02000			0.02000		
Padj[C4]:	0.01000			0.01000			0.01000			0.01000		
Padj[C5]:	-0.10000			-0.10000			-0.10000			-0.10000		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	110	20		276	325		210	260		20	170	
Capacity:	273	300		291	322		282	312		273	301	
DegOfUtil:	0.40	0.07		0.95	1.01		0.74	0.83		0.07	0.56	
DepHeadway:	13.17	11.97		12.38	11.18		12.74	11.54		13.15	11.95	
ServiceTime:	10.9	9.7		10.1	8.9		10.4	9.2		10.9	9.7	
Delay:	24.5	15.5		77.3	87.3		44.8	52.5		16.9	29.1	
Queue:	0.7	0.1		5.0	6.6		2.3	3.3		0.1	1.2	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	454			1018			440			340		
Capacity:	284			302			294			284		
DegOfUtil:	1.60			3.36			1.50			1.20		
DepHeadway:	12.67			11.88			12.24			12.65		
ServiceTime:	10.4			9.6			9.9			10.4		
Delay:	314.8			1093.2			270.5			152.7		
Queue:	23.6			90.6			20.8			10.8		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	249.9			718.1			156.1			107.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	249.9			718.1			156.1			107.9		
LOS by Appr:	F			F			F			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	413.9
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #14

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	110	454	20	276	1018	325	210	440	260	20	340	170

Major Street Volume: 2203
Minor Approach Volume: 910
Minor Approach Volume Threshold: 34 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #18

Cycle (sec): 100 | Critical Vol./Cap.(X): 3.197
Loss Time (sec): 0 (Y+R=4.0 sec) | Average Delay (sec/veh): 409.0
Optimal Cycle: 0 | Level Of Service: F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Volume Module:												
Base Vol:	50	310	80	920	630	390	150	410	95	100	290	340
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	50	310	80	920	630	390	150	410	95	100	290	340
Added Vol:	33	0	0	0	0	0	0	21	35	0	20	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	83	310	80	920	630	390	150	431	130	100	310	340
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	83	310	80	920	630	390	150	431	130	100	310	340
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	83	310	80	920	630	390	150	431	130	100	310	340
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	83	310	80	920	630	390	150	431	130	100	310	340
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	272	283	300	288	300	318	272	282	300	277	289	306
Capacity Analysis Module:												
Vol/Sat:	0.30	1.10	0.27	3.20	2.10	1.23	0.55	1.53	0.43	0.36	1.07	1.11
Crit Moves:		****		****				****				****
Delay/Veh:	21.6	119	19.0	1022	532	158.4	31.0	283	23.6	22.8	111	120.4
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	21.6	119	19.0	1022	532	158.4	31.0	283	23.6	22.8	111	120.4
LOS by Move:	C	F	C	F	F	F	D	F	C	C	F	F
ApproachDel:	84.9			689.1			182.5			103.6		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	84.9			689.1			182.5			103.6		
LOS by Appr:	F			F			F			F		
AllWayAvgQ:	0.4	8.1	0.4	80.5	43.1	12.8	1.1	21.0	0.7	0.5	7.7	9.0

Note: Queue reported is the number of cars per lane.

Level Of Service Detailed Computation Report
2000 HCM 4-Way Stop Method
Future Volume Alternative

****

Intersection #18

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Time Period: 0.25 hour												
HevVeh:	0%			0%			0%			0%		
Alpha Value: 0.01												
GroupType:	6			6			6			6		
P[C1]:	0.0000			0.0000			0.0000			0.0000		
P[C2]:	0.0000			0.0000			0.0000			0.0000		
P[C3]:	0.0000			0.0000			0.0000			0.0000		
P[C4]:	0.0000			0.0000			0.0000			0.0000		
P[C5]:	1.0000			1.0000			1.0000			1.0000		
Padj[C1]:	0.04000			0.04000			0.04000			0.04000		
Padj[C2]:	0.03000			0.03000			0.03000			0.03000		
Padj[C3]:	0.02000			0.02000			0.02000			0.02000		
Padj[C4]:	0.01000			0.01000			0.01000			0.01000		
Padj[C5]:	-0.10000			-0.10000			-0.10000			-0.10000		
Lanes:	L1	L2		L1	L2		L1	L2		L1	L2	
LaneType:	LEFT	RITE		LEFT	RITE		LEFT	RITE		LEFT	RITE	
HeadwayAdj:	0.500	-0.700		0.500	-0.700		0.500	-0.700		0.500	-0.700	
Volume:	83	80		920	390		150	130		100	340	
Capacity:	272	300		288	318		272	300		277	306	
DegOfUtil:	0.30	0.27		3.20	1.23		0.55	0.43		0.36	1.11	
DepHeadway:	13.22	12.02		12.51	11.31		13.22	12.02		12.97	11.77	
ServiceTime:	10.9	9.7		10.2	9.0		10.9	9.7		10.7	9.5	
Delay:	21.6	19.0		1021.5	158.4		31.0	23.6		22.8	120.4	
Queue:	0.4	0.4		80.5	12.8		1.1	0.7		0.5	9.0	
Lane:	L3			L3			L3			L3		
LaneType:	THRU			THRU			THRU			THRU		
HeadwayAdj:	0.000			0.000			0.000			0.000		
Volume:	310			630			431			310		
Capacity:	283			300			282			289		
DegOfUtil:	1.10			2.10			1.52			1.07		
DepHeadway:	12.72			12.01			12.72			12.47		
ServiceTime:	10.4			9.7			10.4			10.2		
Delay:	118.9			532.3			283.2			111.3		
Queue:	8.1			43.1			21.0			7.7		
Approach:	North Bound			South Bound			East Bound			West Bound		
ApproachDel:	84.9			689.1			182.5			103.6		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	84.9			689.1			182.5			103.6		
LOS by Appr:	F			F			F			F		

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

OverallDel:	409.0
OverallLOS:	F

Traffix 7.9.0215 (c) 2008 Dowling Assoc. Licensed to FEHR & PEERS, ROSEVILLE

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #18

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 0 1	0 1		1 0 1	0 1		1 0 1	0 1		1 0 1	0 1	
Initial Vol:	83	310		80	920	630	390	150	431	130	100	310	340

Major Street Volume: 2413
Minor Approach Volume: 750
Minor Approach Volume Threshold: -5 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Mitigated Scenarios

2: Wawona St. & Airport Way Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	11.6	5.9	7.3	3.9	16.8	3.3	6.0
Vehicles Exited	12	10	82	21	8	85	218
Hourly Exit Rate	48	40	328	84	32	340	872

3: Daniels Street & Airport Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	40.7	43.0	5.9	45.4	39.3	6.7	48.4	7.5	1.3	57.7	12.1	2.1
Vehicles Exited	8	3	18	33	8	6	19	96	16	3	79	16
Hourly Exit Rate	32	12	72	132	32	24	76	384	64	12	316	64

3: Daniels Street & Airport Way Performance by movement

Movement	All
Delay / Veh (s)	17.1
Vehicles Exited	305
Hourly Exit Rate	1220

4: SR 120 WB & Airport Way Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Delay / Veh (s)	36.6	8.5	42.6	7.4	10.6	6.9	11.9
Vehicles Exited	7	47	26	80	64	74	298
Hourly Exit Rate	28	188	104	320	256	296	1192

5: SR 120 EB & Airport Way Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	41.7	3.2	19.0	13.9	52.6	4.8	23.0
Vehicles Exited	23	3	81	25	28	38	198
Hourly Exit Rate	92	12	324	100	112	152	792

6: Atherton Dr & Airport Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	41.7		4.5	52.7		7.7	42.4	11.0	5.2	49.2	5.7	1.3
Vehicles Exited	39	0	2	1	0	22	1	44	1	6	26	7
Hourly Exit Rate	156	0	8	4	0	88	4	176	4	24	104	28

6: Atherton Dr & Airport Way Performance by movement

Movement	All
Delay / Veh (s)	19.3
Vehicles Exited	149
Hourly Exit Rate	596

10: Daniels Street & Union Road Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Delay / Veh (s)	28.5	10.1	31.3	2.2	5.4	3.2	5.7
Vehicles Exited	8	26	12	146	194	6	392
Hourly Exit Rate	32	104	48	584	776	24	1568

11: SR 120 WB Ramps & Union Road Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Delay / Veh (s)	29.8	9.0	33.0	5.2	6.7	4.6	8.6
Vehicles Exited	24	61	16	93	128	92	414
Hourly Exit Rate	96	244	64	372	512	368	1656

12: SR 120 EB Ramps & Union Road Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	29.5	7.1	7.3	3.2	27.8	4.2	11.9
Vehicles Exited	30	18	86	20	56	98	308
Hourly Exit Rate	120	72	344	80	224	392	1232

13: Atherton Dr. & Union Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	31.3	9.7	6.6		39.3	3.7	32.2	6.9	3.7	30.2	2.8	1.3
Vehicles Exited	32	1	3	0	1	9	6	63	1	9	92	13
Hourly Exit Rate	128	4	12	0	4	36	24	252	4	36	368	52

13: Atherton Dr. & Union Road Performance by movement

Movement	All
Delay / Veh (s)	10.0
Vehicles Exited	230
Hourly Exit Rate	920

Total Network Performance

Delay / Veh (s)	35.6
Vehicles Exited	887
Hourly Exit Rate	3548

2: Wawona St. & Airport Way Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	15.5	8.5	9.0	5.8	19.6	5.1	7.9
Vehicles Exited	11	9	124	16	18	146	324
Hourly Exit Rate	44	36	496	64	72	584	1296

3: Daniels Street & Airport Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	48.1	47.3	8.9	52.0	40.4	8.4	40.9	12.5	2.0	44.8	18.3	4.9
Vehicles Exited	20	8	33	11	9	2	48	130	18	5	106	48
Hourly Exit Rate	80	32	132	44	36	8	192	520	72	20	424	192

3: Daniels Street & Airport Way Performance by movement

Movement	All
Delay / Veh (s)	19.9
Vehicles Exited	438
Hourly Exit Rate	1752

4: SR 120 WB & Airport Way Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Delay / Veh (s)	39.6	11.5	62.4	13.7	11.0	7.6	15.1
Vehicles Exited	26	56	10	136	115	42	385
Hourly Exit Rate	104	224	40	544	460	168	1540

5: SR 120 EB & Airport Way Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	47.6	13.1	23.6	19.8	42.9	11.8	28.9
Vehicles Exited	84	30	59	14	55	82	324
Hourly Exit Rate	336	120	236	56	220	328	1296

6: Atherton Dr & Airport Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	45.2	29.3	6.9	52.2		6.1	65.7	13.0	8.8	38.9	4.5	1.8
Vehicles Exited	19	2	3	3	0	16	1	36	3	22	75	12
Hourly Exit Rate	76	8	12	12	0	64	4	144	12	88	300	48

6: Atherton Dr & Airport Way Performance by movement

Movement	All
Delay / Veh (s)	15.6
Vehicles Exited	192
Hourly Exit Rate	768

10: Daniels Street & Union Road Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Delay / Veh (s)	33.1	13.8	30.3	3.3	7.7	3.2	7.2
Vehicles Exited	8	24	30	284	189	8	543
Hourly Exit Rate	32	96	120	1136	756	32	2172

11: SR 120 WB Ramps & Union Road Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Delay / Veh (s)	33.8	16.9	40.4	9.3	18.8	11.9	18.3
Vehicles Exited	70	88	60	229	172	37	656
Hourly Exit Rate	280	352	240	916	688	148	2624

12: SR 120 EB Ramps & Union Road Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	32.1	14.9	18.5	8.9	39.3	10.6	19.0
Vehicles Exited	115	69	195	80	59	182	700
Hourly Exit Rate	460	276	780	320	236	728	2800

13: Atherton Dr. & Union Road Performance by movement

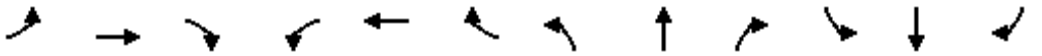
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	55.6	37.7	34.6	41.2	31.7	9.1	37.0	12.1	6.8	28.4	12.6	3.2
Vehicles Exited	190	4	5	2	4	12	19	54	1	7	196	47
Hourly Exit Rate	760	16	20	8	16	48	76	216	4	28	784	188

13: Atherton Dr. & Union Road Performance by movement

Movement	All
Delay / Veh (s)	28.5
Vehicles Exited	541
Hourly Exit Rate	2164

Total Network Performance

Delay / Veh (s)	54.3
Vehicles Exited	1450
Hourly Exit Rate	5800



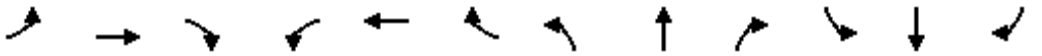
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	4988	1583	3433	4988	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	4988	1583	3433	4988	1583
Volume (vph)	240	432	127	200	221	173	111	538	120	360	665	540
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)	253	455	134	211	233	182	117	566	126	379	700	568
RTOR Reduction (vph)	0	0	109	0	0	148	0	0	82	0	0	297
Lane Group Flow (vph)	253	455	25	211	233	34	117	566	44	379	700	271
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.0	11.3	11.3	6.0	11.3	11.3	4.7	20.9	20.9	6.0	22.2	22.2
Effective Green, g (s)	6.0	11.3	11.3	6.0	11.3	11.3	4.7	20.9	20.9	6.0	22.2	22.2
Actuated g/C Ratio	0.10	0.19	0.19	0.10	0.19	0.19	0.08	0.35	0.35	0.10	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	342	954	297	342	954	297	268	1732	550	342	1839	584
v/s Ratio Prot	c0.07	c0.09		0.06	0.05		0.03	0.11		c0.11	0.14	
v/s Ratio Perm			0.02			0.02			0.03			c0.17
v/c Ratio	0.74	0.48	0.08	0.62	0.24	0.12	0.44	0.33	0.08	1.11	0.38	0.46
Uniform Delay, d1	26.3	21.8	20.2	26.0	20.8	20.3	26.5	14.5	13.2	27.1	14.0	14.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.1	0.4	0.1	3.3	0.1	0.2	1.1	0.5	0.3	81.1	0.6	2.6
Delay (s)	34.5	22.2	20.3	29.3	20.9	20.5	27.6	15.0	13.5	108.2	14.6	17.1
Level of Service	C	C	C	C	C	C	C	B	B	F	B	B
Approach Delay (s)		25.6			23.6			16.6			37.0	
Approach LOS		C			C			B			D	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

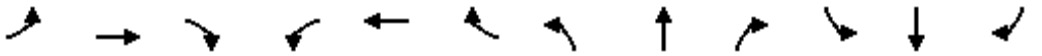
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Frpb, ped/bikes	1.00	0.99	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1562	4988	1548	1770	4988
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1562	4988	1548	1770	4988
Volume (vph)	320	50	719	95	40	952
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	337	53	757	100	42	1002
RTOR Reduction (vph)	0	38	0	62	0	0
Lane Group Flow (vph)	337	15	757	38	42	1002
Confl. Peds. (#/hr)		2		2		
Heavy Vehicles (%)	2%	2%	4%	2%	2%	4%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	11.9	11.9	15.5	15.5	1.9	21.4
Effective Green, g (s)	11.9	11.9	15.5	15.5	1.9	21.4
Actuated g/C Ratio	0.29	0.29	0.38	0.38	0.05	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	510	450	1872	581	81	2585
v/s Ratio Prot	c0.19		0.15		0.02	c0.20
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.66	0.03	0.40	0.06	0.52	0.39
Uniform Delay, d1	12.9	10.6	9.5	8.3	19.3	6.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	0.0	0.1	0.0	5.5	0.1
Delay (s)	16.1	10.6	9.6	8.3	24.8	6.1
Level of Service	B	B	A	A	C	A
Approach Delay (s)	15.4		9.5			6.8
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	41.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



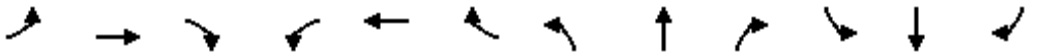
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5085	1583	3433	5085	1583
Volume (vph)	470	40	20	127	35	670	43	1415	181	370	995	675
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)	495	42	21	134	37	705	45	1489	191	389	1047	711
RTOR Reduction (vph)	0	0	18	0	0	2	0	0	124	0	0	216
Lane Group Flow (vph)	495	42	3	134	37	703	45	1489	67	389	1047	495
Turn Type	Prot		Perm	Prot		pm+ov	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.1	11.6	11.6	6.8	5.3	23.5	3.4	28.7	28.7	18.2	43.5	56.6
Effective Green, g (s)	13.1	11.6	11.6	6.8	5.3	23.5	3.4	28.7	28.7	18.2	43.5	56.6
Actuated g/C Ratio	0.16	0.14	0.14	0.08	0.07	0.29	0.04	0.35	0.35	0.22	0.54	0.70
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	553	505	226	287	231	535	74	1795	559	769	2721	1180
v/s Ratio Prot	c0.14	0.01		0.04	0.01	c0.29	0.03	c0.29		0.11	0.21	0.07
v/s Ratio Perm			0.00			0.15			0.04			0.25
v/c Ratio	0.90	0.08	0.01	0.47	0.16	1.31	0.61	0.83	0.12	0.51	0.38	0.42
Uniform Delay, d1	33.4	30.2	29.9	35.5	35.9	28.9	38.3	24.1	17.8	27.6	11.1	5.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.9	0.1	0.0	1.2	0.3	154.1	13.3	3.3	0.1	0.5	0.1	0.2
Delay (s)	50.3	30.3	30.0	36.7	36.2	183.0	51.6	27.4	17.9	28.1	11.2	5.5
Level of Service	D	C	C	D	D	F	D	C	B	C	B	A
Approach Delay (s)		48.0			154.4			27.0			12.4	
Approach LOS		D			F			C			B	

Intersection Summary			
HCM Average Control Delay	44.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	200	311	40	83	537	514	20	925	30	137	315	690
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)	211	327	42	87	565	541	21	974	32	144	332	726
RTOR Reduction (vph)	0	0	30	0	0	15	0	0	23	0	0	145
Lane Group Flow (vph)	211	327	12	87	565	526	21	974	9	144	332	581
Turn Type	Prot		Perm	Prot		pm+ov	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.0	17.9	17.9	3.4	15.3	21.3	1.1	18.0	18.0	6.0	22.9	28.9
Effective Green, g (s)	6.0	17.9	17.9	3.4	15.3	21.3	1.1	18.0	18.0	6.0	22.9	28.9
Actuated g/C Ratio	0.10	0.29	0.29	0.06	0.25	0.35	0.02	0.29	0.29	0.10	0.37	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	336	1033	462	190	883	653	62	1493	465	336	1900	850
v/s Ratio Prot	0.06	c0.09		0.03	0.16	c0.08	0.01	0.19		0.04	0.07	c0.07
v/s Ratio Perm			0.01			0.25			0.01			0.30
v/c Ratio	0.63	0.32	0.03	0.46	0.64	0.81	0.34	0.65	0.02	0.43	0.17	0.68
Uniform Delay, d1	26.6	16.9	15.5	28.1	20.5	18.1	29.7	18.9	15.4	26.0	12.9	12.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.6	0.2	0.0	1.7	1.5	7.2	3.2	1.0	0.0	0.9	0.0	2.3
Delay (s)	30.2	17.1	15.5	29.8	22.1	25.3	33.0	20.0	15.4	26.9	12.9	14.9
Level of Service	C	B	B	C	C	C	C	B	B	C	B	B
Approach Delay (s)		21.8			24.1			20.1			15.8	
Approach LOS		C			C			C			B	

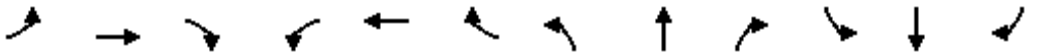
Intersection Summary			
HCM Average Control Delay	20.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3343	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3343	1583	1770	3539	1583
Volume (vph)	150	400	192	301	170	70	194	547	164	70	481	230
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)	158	421	202	317	179	74	204	576	173	74	506	242
RTOR Reduction (vph)	0	0	161	0	0	53	0	0	119	0	0	171
Lane Group Flow (vph)	158	421	41	317	179	21	204	576	54	74	506	71
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.6	15.4	15.4	15.9	21.7	21.7	6.0	23.4	23.4	4.7	22.1	22.1
Effective Green, g (s)	9.6	15.4	15.4	15.9	21.7	21.7	6.0	23.4	23.4	4.7	22.1	22.1
Actuated g/C Ratio	0.13	0.20	0.20	0.21	0.29	0.29	0.08	0.31	0.31	0.06	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	225	723	323	373	1019	456	273	1037	491	110	1037	464
v/s Ratio Prot	0.09	c0.12		c0.18	0.05		c0.06	c0.17		0.04	0.14	
v/s Ratio Perm			0.03			0.01			0.03			0.04
v/c Ratio	0.70	0.58	0.13	0.85	0.18	0.05	0.75	0.56	0.11	0.67	0.49	0.15
Uniform Delay, d1	31.5	27.1	24.5	28.6	20.1	19.4	34.0	21.7	18.6	34.6	22.0	19.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.5	1.2	0.2	16.4	0.1	0.0	10.6	2.1	0.4	15.0	1.6	0.7
Delay (s)	41.0	28.3	24.7	45.0	20.2	19.4	44.6	23.8	19.0	49.6	23.6	20.4
Level of Service	D	C	C	D	C	B	D	C	B	D	C	C
Approach Delay (s)		29.9			33.9			27.4			25.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	75.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

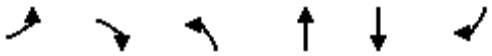
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1667		1770	1732		1770	3343	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1667		1770	1732		1770	3343	1583	1770	3539	1583
Volume (vph)	80	90	212	210	90	80	159	821	113	120	933	20
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)	84	95	223	221	95	84	167	864	119	126	982	21
RTOR Reduction (vph)	0	99	0	0	36	0	0	0	75	0	0	14
Lane Group Flow (vph)	84	219	0	221	143	0	167	864	44	126	982	7
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	6.7	15.7		13.1	22.1		9.8	31.4	31.4	8.6	30.2	30.2
Effective Green, g (s)	6.7	15.7		13.1	22.1		9.8	31.4	31.4	8.6	30.2	30.2
Actuated g/C Ratio	0.08	0.19		0.15	0.26		0.12	0.37	0.37	0.10	0.36	0.36
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	140	309		273	451		205	1238	586	180	1260	564
v/s Ratio Prot	0.05	c0.13		c0.12	0.08		c0.09	0.26		0.07	c0.28	
v/s Ratio Perm									0.03			0.00
v/c Ratio	0.60	0.71		0.81	0.32		0.81	0.70	0.08	0.70	0.78	0.01
Uniform Delay, d1	37.8	32.4		34.6	25.3		36.6	22.7	17.3	36.9	24.3	17.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.8	7.5		16.0	0.4		21.4	3.3	0.2	11.3	4.8	0.0
Delay (s)	44.5	39.9		50.7	25.7		58.0	26.0	17.5	48.1	29.1	17.7
Level of Service	D	D		D	C		E	C	B	D	C	B
Approach Delay (s)		40.9			39.5			29.7			31.1	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	5	27	1503	633	16
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	5	28	1582	666	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				729	530	
pX, platoon unblocked	0.71	0.94	0.94			
vC, conflicting volume	1523	342	683			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1093	245	606			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	97			
cM capacity (veh/h)	143	714	914			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	5	28	791	791	444	239
Volume Left	0	28	0	0	0	0
Volume Right	5	0	0	0	0	17
cSH	714	914	1700	1700	1700	1700
Volume to Capacity	0.01	0.03	0.47	0.47	0.26	0.14
Queue Length 95th (ft)	1	2	0	0	0	0
Control Delay (s)	10.1	9.1	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.1	0.2			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	44.9%	ICU Level of Service	A	
Analysis Period (min)	15			

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *AM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *4: SR 120 WB & Airport Way* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	926	175	19	14	13.2	B	2.1
	R	1221	230	19	10	10.3	B	0.9
	Subtotal	**2147**	**405**	**19**	**--**	**11.5**	**B**	**--**
SB	T	814	210	26	13	17.7	B	1.7
	R	705	171	24	9	10.2	B	1.0
	Subtotal	**1519**	**381**	**25**	**--**	**14.3**	**B**	**--**
WB	L	1168	284	24	12	24.7	C	2.4
	R	537	130	24	8	21.7	C	3.4
	Subtotal	**1705**	**414**	**24**	**--**	**23.7**	**C**	**--**
	Total	**5372**	**1201**	**22**	**--**	**16.6**	**B**	**--**

Intersection: *5: SR 120 EB & Airport Way* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	1842	332	18	13	17.6	B	2.3
	R	847	148	17	6	13.8	B	1.4
	Subtotal	**2689**	**480**	**18**	**--**	**16.4**	**B**	**--**
SB	T	1674	412	25	14	10.3	B	0.9
	R	308	80	26	12	7.3	A	2.1
	Subtotal	**1982**	**492**	**25**	**--**	**9.8**	**A**	**--**
EB	L	305	70	23	7	24.4	C	3.5
	R	474	109	23	8	21.0	C	2.4
	Subtotal	**779**	**179**	**23**	**--**	**22.3**	**C**	**--**
	Total	**5451**	**1150**	**21**	**--**	**14.5**	**B**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *AM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *10: Daniels Street & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	102	25	25	4	32.2	C	11.5
	T	1162	281	24	8	5.1	A	1.0
	Subtotal	**1264**	**306**	**24**	**--**	**7.3**	**A**	**--**
SB	T	1382	325	24	18	15.2	B	3.3
	R	32	8	25	4	17.3	B	11.8
	Subtotal	**1414**	**333**	**24**	**--**	**15.2**	**B**	**--**
EB	L	42	10	24	2	19.6	B	5.2
	R	158	39	25	9	13.7	B	2.7
	Subtotal	**200**	**49**	**25**	**--**	**14.9**	**B**	**--**
	Total	**2878**	**689**	**24**	**--**	**11.7**	**B**	**--**

Intersection: *11: SR 120 WB Ramps & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	896	216	24	9	9.4	A	1.0
	R	872	207	24	12	11.0	B	1.5
	Subtotal	**1767**	**424**	**24**	**--**	**10.2**	**B**	**--**
SB	T	845	204	24	19	10.8	B	1.9
	R	695	164	24	12	6.4	A	0.8
	Subtotal	**1540**	**368**	**24**	**--**	**8.8**	**A**	**--**
WB	L	266	61	23	9	23.5	C	4.5
	R	368	95	26	12	17.4	B	3.3
	Subtotal	**635**	**155**	**24**	**--**	**19.8**	**B**	**--**
	Total	**3942**	**947**	**24**	**--**	**11.2**	**B**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *AM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *12: SR 120 EB Ramps & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	1536	382	25	13	11.7	B	2.1
	R	273	65	24	9	5.0	A	0.9
	Subtotal	**1808**	**447**	**25**	**--**	**10.8**	**B**	**--**
SB	T	827	194	23	19	10.1	B	1.9
	R	284	66	23	10	4.6	A	1.2
	Subtotal	**1112**	**260**	**23**	**--**	**8.7**	**A**	**--**
EB	L	232	56	24	5	26.1	C	4.9
	R	423	100	24	9	15.1	B	2.5
	Subtotal	**655**	**156**	**24**	**--**	**19.0**	**B**	**--**
	Total	**3575**	**864**	**24**	**--**	**11.6**	**B**	**--**

Intersection: *13: Atherton Dr. & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	74	19	26	1	69.1	E	13.6
	T	1392	317	23	9	39.8	D	9.6
	R	134	29	22	4	24.8	C	9.7
	Subtotal	**1599**	**365**	**23**	**--**	**40.1**	**D**	**--**
SB	L	563	129	23	11	51.2	D	12.0
	T	598	144	24	16	9.5	A	2.2
	R	49	12	24	4	2.5	A	1.2
	Subtotal	**1211**	**284**	**23**	**--**	**28.1**	**C**	**--**
EB	L	98	24	24	7	57.5	E	14.3
	T	6	2	33	1	43.4	D	30.0
	R	17	4	24	3	9.5	A	8.7
	Subtotal	**121**	**30**	**25**	**--**	**50.4**	**D**	**--**
WB	L	108	26	24	6	50.6	D	12.1
	T	8	2	25	2	65.8	E	51.8
	R	311	75	24	13	15.8	B	5.1
	Subtotal	**427**	**104**	**24**	**--**	**25.7**	**C**	**--**
	Total	**3358**	**783**	**23**	**--**	**34.2**	**C**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *AM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *15: SR 120 WB Ramp & Main Street* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	994	234	24	20	7.0	A	1.4
	R	547	128	23	11	4.9	A	1.5
	Subtotal	**1541**	**362**	**23**	**--**	**6.2**	**A**	**--**
SB	T	432	108	25	8	13.9	B	1.1
	R	1032	241	23	16	21.8	C	4.0
	Subtotal	**1463**	**349**	**24**	**--**	**19.4**	**B**	**--**
WB	L	274	62	23	12	36.7	D	7.8
	R	326	74	23	11	9.3	A	2.4
	Subtotal	**600**	**136**	**23**	**--**	**21.7**	**C**	**--**
	Total	**3604**	**847**	**24**	**--**	**14.1**	**B**	**--**

Intersection: *16: SR 120 EB Ramps & Main Street* ***Type:*** *Signalized*

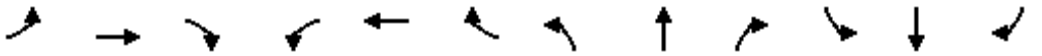
Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	989	240	24	9	11.0	B	2.4
	R	484	114	24	9	3.9	A	0.6
	Subtotal	**1474**	**354**	**24**	**--**	**8.7**	**A**	**--**
SB	T	526	135	26	13	9.5	A	2.2
	R	179	39	22	6	3.4	A	0.9
	Subtotal	**705**	**175**	**25**	**--**	**8.1**	**A**	**--**
EB	L	552	128	23	7	34.5	C	5.4
	R	484	117	24	12	14.2	B	2.5
	Subtotal	**1036**	**245**	**24**	**--**	**24.8**	**C**	**--**
	Total	**3215**	**774**	**24**	**--**	**13.7**	**B**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *AM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *17: Atherton Drive & Main Street* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	263	65	25	6	36.6	D	3.7
	T	1347	318	24	9	4.4	A	0.7
	Subtotal	**1611**	**383**	**24**	**--**	**9.9**	**A**	**--**
SB	T	621	155	25	17	9.1	A	1.9
	R	389	97	25	3	7.0	A	1.4
	Subtotal	**1011**	**253**	**25**	**--**	**8.2**	**A**	**--**
EB	L	126	28	22	4	37.2	D	9.6
	R	74	19	26	5	5.7	A	2.4
	Subtotal	**200**	**46**	**23**	**--**	**24.4**	**C**	**--**
	Total	**2821**	**682**	**24**	**--**	**10.2**	**B**	**--**



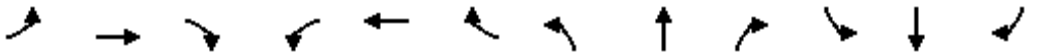
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	4988	1583	3433	4988	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	4988	1583	3433	4988	1583
Volume (vph)	560	352	187	275	352	334	222	1189	280	283	638	320
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)	589	371	197	289	371	352	234	1252	295	298	672	337
RTOR Reduction (vph)	0	0	150	0	0	183	0	0	197	0	0	239
Lane Group Flow (vph)	589	371	47	289	371	169	234	1252	98	298	672	98
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	15.4	18.1	18.1	10.1	12.8	12.8	9.2	23.1	23.1	8.0	21.9	21.9
Effective Green, g (s)	15.4	18.1	18.1	10.1	12.8	12.8	9.2	23.1	23.1	8.0	21.9	21.9
Actuated g/C Ratio	0.20	0.24	0.24	0.13	0.17	0.17	0.12	0.31	0.31	0.11	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	702	1222	381	460	864	269	419	1530	486	365	1451	460
v/s Ratio Prot	c0.17	0.07		0.08	0.07		0.07	c0.25		c0.09	0.13	
v/s Ratio Perm			0.03			c0.11			0.06			0.06
v/c Ratio	0.84	0.30	0.12	0.63	0.43	0.63	0.56	0.82	0.20	0.82	0.46	0.21
Uniform Delay, d1	28.8	23.4	22.4	30.8	28.0	29.0	31.1	24.2	19.3	32.9	21.9	20.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.7	0.1	0.1	2.7	0.3	4.6	1.6	5.0	0.9	13.2	1.1	1.1
Delay (s)	37.4	23.6	22.5	33.5	28.3	33.6	32.8	29.2	20.2	46.1	22.9	21.2
Level of Service	D	C	C	C	C	C	C	C	C	D	C	C
Approach Delay (s)		30.5			31.6			28.1			27.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

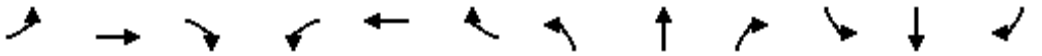
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Frpb, ped/bikes	1.00	0.99	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1560	4988	1545	1770	4988
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1560	4988	1545	1770	4988
Volume (vph)	110	40	1651	350	80	1020
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	42	1738	368	84	1074
RTOR Reduction (vph)	0	36	0	144	0	0
Lane Group Flow (vph)	116	6	1738	224	84	1074
Confl. Peds. (#/hr)		2		2		
Heavy Vehicles (%)	2%	2%	4%	2%	2%	4%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	10.3	10.3	41.4	41.4	4.4	49.8
Effective Green, g (s)	10.3	10.3	41.4	41.4	4.4	49.8
Actuated g/C Ratio	0.15	0.15	0.61	0.61	0.06	0.73
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	268	236	3032	939	114	3648
v/s Ratio Prot	c0.07		c0.35		c0.05	0.22
v/s Ratio Perm		0.00		0.14		
v/c Ratio	0.43	0.03	0.57	0.24	0.74	0.29
Uniform Delay, d1	26.2	24.6	8.0	6.1	31.3	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.0	0.3	0.1	21.7	0.0
Delay (s)	27.4	24.7	8.3	6.3	53.0	3.2
Level of Service	C	C	A	A	D	A
Approach Delay (s)	26.7		7.9			6.8
Approach LOS	C		A			A

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	68.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



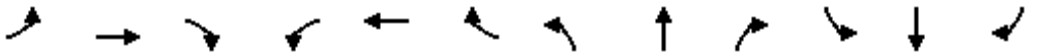
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5085	1583	3433	5085	1583
Volume (vph)	730	45	38	162	55	625	59	875	152	790	1485	560
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)	768	47	40	171	58	658	62	921	160	832	1563	589
RTOR Reduction (vph)	0	0	34	0	0	3	0	0	123	0	0	179
Lane Group Flow (vph)	768	47	6	171	58	655	62	921	37	832	1563	410
Turn Type	Prot		Perm	Prot		pm+ov	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	20.2	12.2	12.2	13.5	5.5	26.7	3.4	18.9	18.9	21.2	36.7	56.9
Effective Green, g (s)	20.2	12.2	12.2	13.5	5.5	26.7	3.4	18.9	18.9	21.2	36.7	56.9
Actuated g/C Ratio	0.25	0.15	0.15	0.17	0.07	0.33	0.04	0.23	0.23	0.26	0.45	0.70
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	848	528	236	567	238	594	74	1175	366	890	2281	1179
v/s Ratio Prot	c0.22	0.01		0.05	0.02	c0.29	0.04	c0.18		0.24	0.31	0.09
v/s Ratio Perm			0.00			0.13			0.02			0.17
v/c Ratio	0.91	0.09	0.03	0.30	0.24	1.10	0.84	0.78	0.10	0.93	0.69	0.35
Uniform Delay, d1	29.9	30.0	29.7	30.0	36.2	27.5	38.9	29.5	24.8	29.6	18.0	5.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.1	0.1	0.0	0.3	0.5	68.0	53.0	3.5	0.1	16.5	0.9	0.2
Delay (s)	43.0	30.1	29.8	30.3	36.7	95.6	91.9	33.0	24.9	46.1	18.8	5.2
Level of Service	D	C	C	C	D	F	F	C	C	D	B	A
Approach Delay (s)		41.6			79.1			35.1			23.7	
Approach LOS		D			E			D			C	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	81.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	480	493	30	74	420	296	40	310	53	530	1030	125
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)	505	519	32	78	442	312	42	326	56	558	1084	132
RTOR Reduction (vph)	0	0	22	0	0	61	0	0	45	0	0	63
Lane Group Flow (vph)	505	519	10	78	442	251	42	326	11	558	1084	69
Turn Type	Prot		Perm	Prot		pm+ov	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.5	22.0	22.0	4.6	14.1	27.5	3.3	14.0	14.0	13.4	24.1	36.6
Effective Green, g (s)	12.5	22.0	22.0	4.6	14.1	27.5	3.3	14.0	14.0	13.4	24.1	36.6
Actuated g/C Ratio	0.18	0.31	0.31	0.07	0.20	0.39	0.05	0.20	0.20	0.19	0.34	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	613	1112	498	226	713	712	162	1017	317	657	1751	918
v/s Ratio Prot	c0.15	0.15		0.02	c0.12	0.07	0.01	0.06		c0.16	c0.21	0.01
v/s Ratio Perm			0.01			0.09			0.01			0.03
v/c Ratio	0.82	0.47	0.02	0.35	0.62	0.35	0.26	0.32	0.04	0.85	0.62	0.08
Uniform Delay, d1	27.7	19.3	16.6	31.3	25.5	15.0	32.2	23.9	22.6	27.3	19.1	8.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.8	0.3	0.0	0.9	1.6	0.3	0.9	0.2	0.0	10.0	0.7	0.0
Delay (s)	36.5	19.6	16.6	32.2	27.1	15.3	33.0	24.1	22.6	37.3	19.8	8.3
Level of Service	D	B	B	C	C	B	C	C	C	D	B	A
Approach Delay (s)		27.6			23.2			24.8			24.5	
Approach LOS		C			C			C			C	

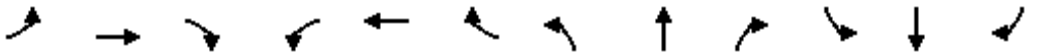
Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3343	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3343	1583	1770	3539	1583
Volume (vph)	290	520	310	201	550	120	291	640	153	130	633	230
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)	305	547	326	212	579	126	306	674	161	137	666	242
RTOR Reduction (vph)	0	0	212	0	0	98	0	0	117	0	0	176
Lane Group Flow (vph)	305	547	114	212	579	28	306	674	44	137	666	66
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.9	20.1	20.1	12.1	17.3	17.3	8.0	21.1	21.1	7.9	21.0	21.0
Effective Green, g (s)	14.9	20.1	20.1	12.1	17.3	17.3	8.0	21.1	21.1	7.9	21.0	21.0
Actuated g/C Ratio	0.19	0.26	0.26	0.16	0.22	0.22	0.10	0.27	0.27	0.10	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	342	921	412	277	793	355	356	914	433	181	963	431
v/s Ratio Prot	c0.17	c0.15		0.12	c0.16		c0.09	c0.20		0.08	0.19	
v/s Ratio Perm			0.07			0.02			0.03			0.04
v/c Ratio	0.89	0.59	0.28	0.77	0.73	0.08	0.86	0.74	0.10	0.76	0.69	0.15
Uniform Delay, d1	30.4	25.0	22.8	31.2	27.8	23.7	34.0	25.5	21.0	33.7	25.2	21.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.0	1.0	0.4	11.9	3.5	0.1	18.2	5.3	0.5	16.4	4.1	0.8
Delay (s)	54.3	26.0	23.1	43.1	31.3	23.8	52.3	30.8	21.4	50.1	29.3	22.1
Level of Service	D	C	C	D	C	C	D	C	C	D	C	C
Approach Delay (s)		32.5			33.0			35.3			30.3	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	77.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

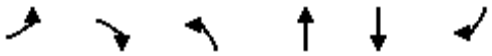
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.92		1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1707		1770	1705		1770	3343	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1707		1770	1705		1770	3343	1583	1770	3539	1583
Volume (vph)	110	100	125	128	100	130	214	1040	238	160	880	110
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)	116	105	132	135	105	137	225	1095	251	168	926	116
RTOR Reduction (vph)	0	62	0	0	65	0	0	0	150	0	0	74
Lane Group Flow (vph)	116	175	0	135	177	0	225	1095	101	168	926	42
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	6.0	12.4		7.0	13.4		11.0	29.1	29.1	8.0	26.1	26.1
Effective Green, g (s)	6.0	12.4		7.0	13.4		11.0	29.1	29.1	8.0	26.1	26.1
Actuated g/C Ratio	0.08	0.17		0.10	0.18		0.15	0.40	0.40	0.11	0.36	0.36
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	146	292		171	315		269	1342	635	195	1274	570
v/s Ratio Prot	0.07	0.10		c0.08	c0.10		c0.13	c0.33		0.09	0.26	
v/s Ratio Perm									0.06			0.03
v/c Ratio	0.79	0.60		0.79	0.56		0.84	0.82	0.16	0.86	0.73	0.07
Uniform Delay, d1	32.6	27.8		32.0	26.9		29.9	19.3	13.9	31.7	20.1	15.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.0	3.3		21.1	2.3		19.7	5.6	0.5	30.1	3.7	0.2
Delay (s)	57.6	31.0		53.1	29.2		49.5	24.9	14.4	61.8	23.8	15.5
Level of Service	E	C		D	C		D	C	B	E	C	B
Approach Delay (s)		39.8			37.7			26.7			28.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	72.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	14	41	774	1550	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	15	43	815	1632	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				729	530	
pX, platoon unblocked	0.67	0.65	0.65			
vC, conflicting volume	2157	847	1695			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2077	235	1533			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	85			
cM capacity (veh/h)	26	501	281			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	15	43	407	407	1088	607
Volume Left	0	43	0	0	0	0
Volume Right	15	0	0	0	0	63
cSH	501	281	1700	1700	1700	1700
Volume to Capacity	0.03	0.15	0.24	0.24	0.64	0.36
Queue Length 95th (ft)	2	13	0	0	0	0
Control Delay (s)	12.4	20.1	0.0	0.0	0.0	0.0
Lane LOS	B	C				
Approach Delay (s)	12.4	1.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *PM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *4: SR 120 WB & Airport Way* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	1695	385	23	16	25.8	C	5.5
	R	463	106	23	4	9.9	A	1.3
	Subtotal	**2158**	**491**	**23**	**--**	**22.4**	**C**	**--**
SB	T	1383	323	23	10	21.9	C	2.6
	R	800	175	22	10	14.0	B	4.2
	Subtotal	**2183**	**497**	**23**	**--**	**19.1**	**B**	**--**
WB	L	879	201	23	17	27.7	C	3.8
	R	538	117	22	10	23.5	C	4.0
	Subtotal	**1417**	**318**	**22**	**--**	**26.2**	**C**	**--**
	Total	**5758**	**1306**	**23**	**--**	**22.1**	**C**	**--**

Intersection: *5: SR 120 EB & Airport Way* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	1305	283	22	8	25.6	C	2.0
	R	1042	225	22	21	20.1	C	6.7
	Subtotal	**2347**	**508**	**22**	**--**	**23.2**	**C**	**--**
SB	T	1668	387	23	6	29.4	C	2.9
	R	594	131	22	8	9.7	A	1.5
	Subtotal	**2262**	**518**	**23**	**--**	**24.4**	**C**	**--**
EB	L	853	197	23	15	29.8	C	5.6
	R	1316	316	24	14	36.3	D	10.3
	Subtotal	**2168**	**513**	**24**	**--**	**33.8**	**C**	**--**
	Total	**6778**	**1539**	**23**	**--**	**27.1**	**C**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *PM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *10: Daniels Street & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	184	42	23	8	34.1	C	7.0
	T	1668	391	23	10	6.8	A	2.4
	Subtotal	**1853**	**433**	**23**	**--**	**9.4**	**A**	**--**
SB	T	1224	283	23	15	18.3	B	3.8
	R	42	10	24	3	18.8	B	7.4
	Subtotal	**1266**	**293**	**23**	**--**	**18.4**	**B**	**--**
EB	L	42	12	29	3	40.3	D	12.2
	R	145	33	23	6	22.0	C	5.8
	Subtotal	**187**	**45**	**24**	**--**	**26.8**	**C**	**--**
	Total	**3306**	**771**	**23**	**--**	**13.8**	**B**	**--**

Intersection: *11: SR 120 WB Ramps & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	1389	316	23	17	21.5	C	5.6
	R	632	145	23	12	7.0	A	1.5
	Subtotal	**2021**	**461**	**23**	**--**	**16.9**	**B**	**--**
SB	T	1043	240	23	17	11.9	B	3.6
	R	326	77	24	4	5.5	A	1.3
	Subtotal	**1369**	**317**	**23**	**--**	**10.3**	**B**	**--**
WB	L	340	85	25	7	37.1	D	2.6
	R	463	113	24	5	33.2	C	5.2
	Subtotal	**803**	**197**	**25**	**--**	**34.9**	**C**	**--**
	Total	**4194**	**976**	**23**	**--**	**18.4**	**B**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *PM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *12: SR 120 EB Ramps & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	1379	372	27	10	22.8	C	3.4
	R	323	76	24	13	4.6	A	1.7
	Subtotal	**1702**	**449**	**26**	**--**	**19.7**	**B**	**--**
SB	T	1067	249	23	18	39.9	D	7.9
	R	316	71	22	7	19.3	B	9.3
	Subtotal	**1383**	**320**	**23**	**--**	**35.3**	**D**	**--**
EB	L	642	144	22	14	25.0	C	6.3
	R	1166	271	23	21	32.9	C	9.5
	Subtotal	**1808**	**415**	**23**	**--**	**30.2**	**C**	**--**
	Total	**4894**	**1184**	**24**	**--**	**27.6**	**C**	**--**

Intersection: *13: Atherton Dr. & Union Road* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	222	53	24	3	68.8	E	19.6
	T	544	129	24	11	32.9	C	3.7
	R	144	35	24	4	12.4	B	2.1
	Subtotal	**911**	**217**	**24**	**--**	**38.4**	**D**	**--**
SB	L	500	108	22	15	66.9	E	12.2
	T	1401	362	26	14	45.0	D	13.3
	R	152	37	24	6	25.4	C	13.0
	Subtotal	**2053**	**507**	**25**	**--**	**48.2**	**D**	**--**
EB	L	704	166	24	7	104.4	F	41.7
	T	37	8	22	5	61.9	E	40.0
	R	40	8	20	3	29.4	C	16.9
	Subtotal	**781**	**182**	**23**	**--**	**99.0**	**F**	**--**
WB	L	319	76	24	12	28.4	C	7.3
	T	27	6	22	3	32.9	C	17.9
	R	547	127	23	7	14.4	B	1.6
	Subtotal	**894**	**208**	**23**	**--**	**20.0**	**C**	**--**
	Total	**4638**	**1115**	**24**	**--**	**49.4**	**D**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *PM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *15: SR 120 WB Ramp & Main Street* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	1591	383	24	25	30.7	C	10.1
	R	400	94	24	8	3.2	A	0.9
	Subtotal	**1991**	**477**	**24**	**--**	**25.3**	**C**	**--**
SB	T	779	180	23	12	20.7	C	2.7
	R	844	202	24	9	20.7	C	2.8
	Subtotal	**1623**	**382**	**24**	**--**	**20.7**	**C**	**--**
WB	L	779	182	23	10	34.5	C	2.3
	R	368	88	24	6	23.2	C	4.1
	Subtotal	**1147**	**270**	**24**	**--**	**30.8**	**C**	**--**
	Total	**4761**	**1129**	**24**	**--**	**25.0**	**C**	**--**

Intersection: *16: SR 120 EB Ramps & Main Street* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	832	213	26	15	10.8	B	1.0
	R	421	101	24	10	3.8	A	0.8
	Subtotal	**1253**	**314**	**25**	**--**	**8.6**	**A**	**--**
SB	T	1253	293	23	21	30.9	C	10.9
	R	305	76	25	8	20.3	C	11.0
	Subtotal	**1558**	**369**	**24**	**--**	**28.7**	**C**	**--**
EB	L	1159	276	24	22	34.3	C	4.5
	R	1000	240	24	17	21.6	C	3.1
	Subtotal	**2159**	**515**	**24**	**--**	**28.4**	**C**	**--**
	Total	**4969**	**1199**	**24**	**--**	**23.3**	**C**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: *Union Crossing EIR* ***HCM:*** *2000*
Scenario: *Cumulative Mitigated* ***# of Runs:*** *7*
TOD: *PM Peak* ***Analysis Period:*** *Hourly* ***PHF:*** *0.95*

Intersection: *17: Atherton Drive & Main Street* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	179	43	24	7	42.2	D	4.8
	T	663	161	24	6	7.5	A	1.1
	Subtotal	**842**	**204**	**24**	**--**	**14.9**	**B**	**--**
SB	T	1747	424	24	11	20.7	C	2.6
	R	505	114	23	14	10.0	A	2.4
	Subtotal	**2253**	**538**	**24**	**--**	**18.5**	**B**	**--**
EB	L	621	149	24	16	37.5	D	6.7
	R	295	71	24	5	16.7	B	2.2
	Subtotal	**916**	**220**	**24**	**--**	**30.8**	**C**	**--**
	Total	**4011**	**961**	**24**	**--**	**20.5**	**C**	**--**