APPENDIX N

Traffic Impact Study Attachments

ATTACHMENT VI – C - 1

NORTH FORK CASINO PROJECT

ALTERNATIVE C

TRIP GENERATION DATA

North Fork Alternative C
Summary of Multi-Use Trip Generation
Average Weekday Driveway Volumes
September 29, 2005

Land Use	Size	24 Hour Two-Way Volume	AM Pk Hour Enter	AM Pk Hour Exit	PM Pk Hour Enter	PM Pk Hour Exit
Free-Standing Discount Superstore	125 Th.Gr.Sq.Ft.	6151	118	113	238	246
Discount Club	100 Th.Gr.Sq.Ft.	4180	40	16	212	212
Fast-Food Restaurant with Drive-Thru	3 Th.Gr.Sq.Ft.	1488	81	78	54	50
High Turnover (Sit-Down) Restaurant	4 Th.Gr.Sq.Ft.	509	24	22	27	17
High Turnover (Sit-Down) Restaurant	5 Th.Gr.Sq.Ft.	636	30	28	33	21
Total		12964	293	257	564	546

Note: A zero indicates no data available.

TRIP GENERATION BY MICROTRANS

North Fork Alternative C
Summary of Multi-Use Trip Generation
Saturday and Sunday Driveway Volumes
September 29, 2005

		Saturday			Sunday		
Land Use	Size	24 Hr 2-Way Vol.	Peak Hour Enter	Peak Hour Exit	24 Hr 2-Way Vol.	Peak Hour Enter	Peak Hour Exit
Free-Standing Discount Superstore	125 Th.Gr.Sq.Ft.	7188	320	306	5873	278	256
Discount Club	100 Th.Gr.Sq.Ft.	5375	336	349	3367	281	281
Fast-Food Restaurant with Drive-Thru	3 Th.Gr.Sq.Ft.	2166	91	87	1628	105	113
High Turnover (Sit-Down) Restaurant	4 Th.Gr.Sq.Ft.	633	50	30	527	41	33
High Turnover (Sit-Down) Restaurant	5 Th.Gr.Sq.Ft.	792	63	37	659	51	42
Total		16154	860	809	12054	756	725

Note: A zero indicates no data available.

TRIP GENERATION BY MICROTRANS

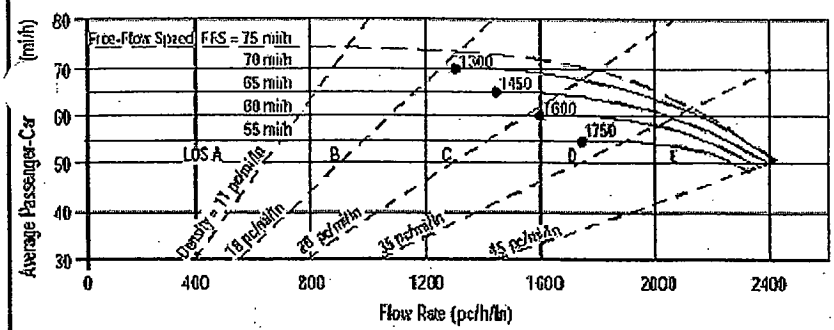
ATTACHMENT VI – C - 2

EXISTING (2005) CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing AM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2462*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

lculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1537*	pc/h/ln
S	*69.7*	mi/h
D = v_p / S	*22.1*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

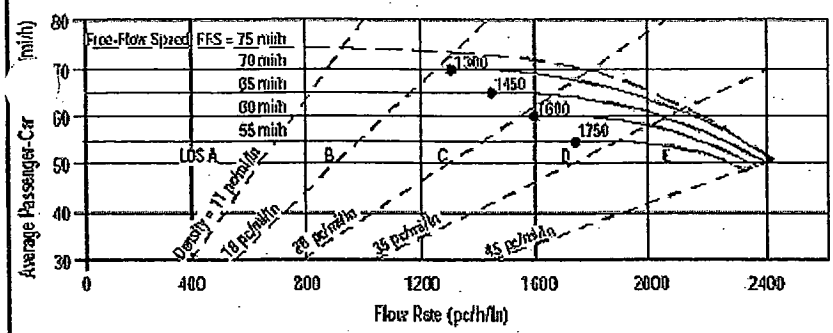
N - Number of lanes
Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing PM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2405*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

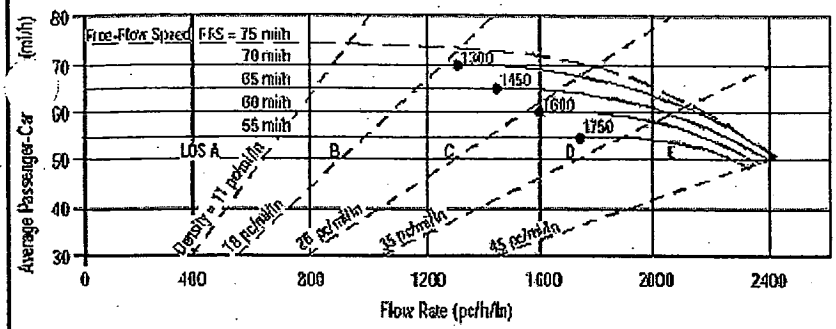
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1502*	pc/h/ln	Design LOS	
S	*69.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*21.5*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing AM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2013*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

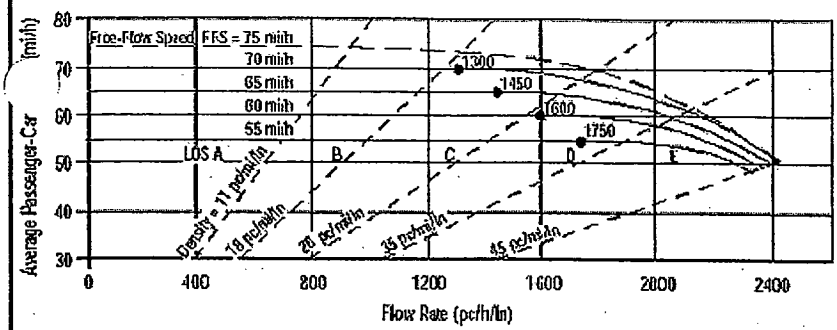
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1257*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*18.0*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing PM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2942*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

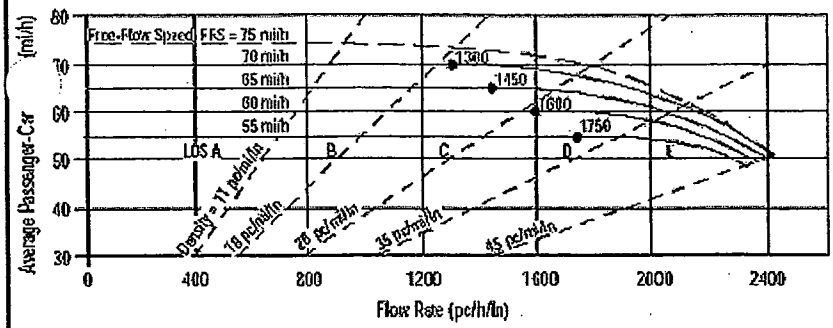
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1837*	pc/h/ln	Design LOS		
S	*67.4*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*27.2*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*9/24/2005*
Analysis Time Period	*Existing AM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2699*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1685*	pc/h/ln
S	*68.9*	mi/h
D = v_p / S	*24.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

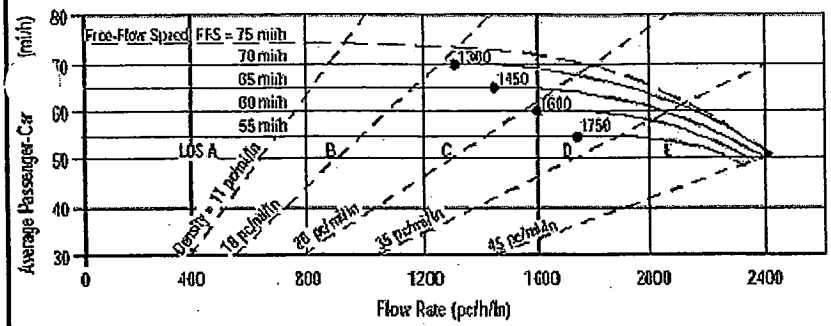
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*9/24/2005*
Analysis Time Period	*Existing PM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2636*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1646*	pc/h/ln
S	*69.2*	mi/h
D = v_p / S	*23.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

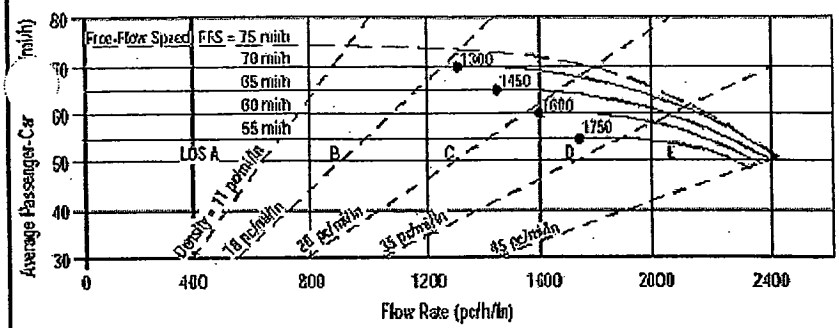
N - Number of lanes	S - Speed
Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing AM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2206*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

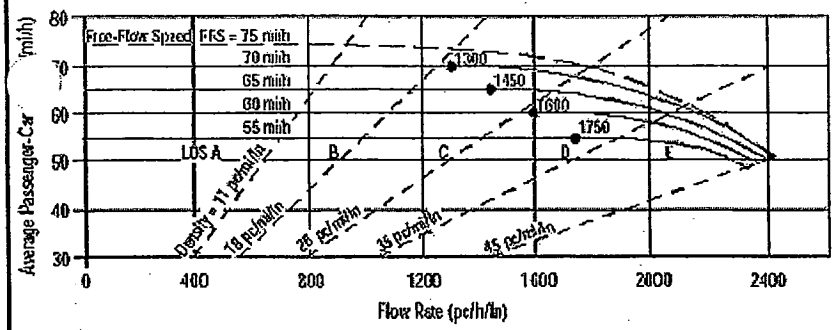
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1378*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*19.7*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing PM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3224*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

E_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

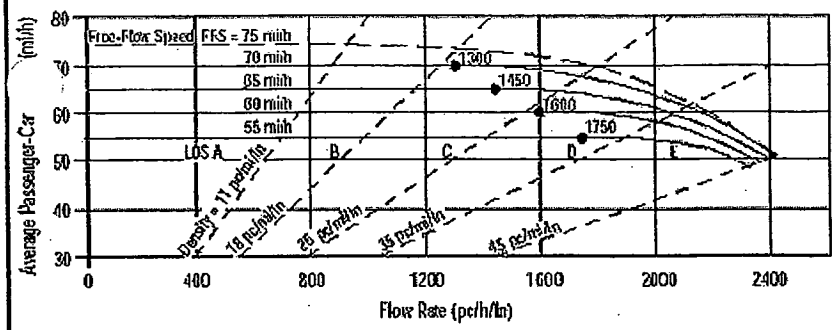
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2013*	pc/h/ln	Design LOS		
S	*64.6*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*31.2*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing AM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2604*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

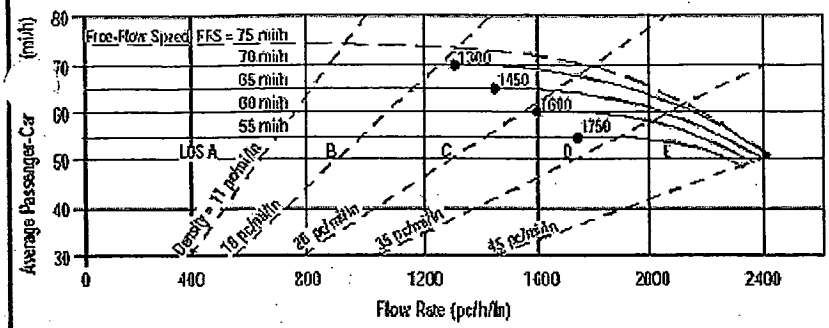
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1626*	pc/h/ln	Design LOS		
S	*69.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*23.5*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing PM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2544*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

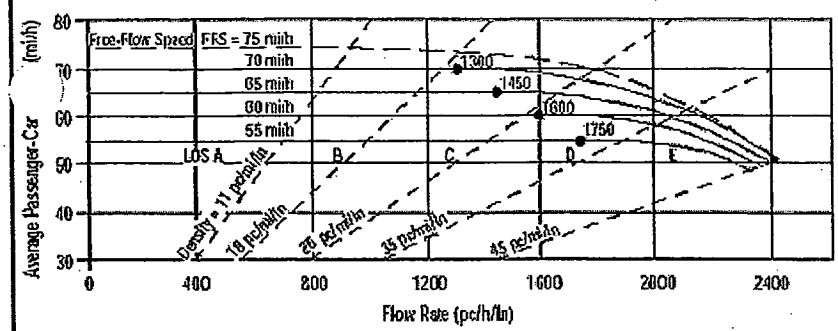
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1589*	pc/h/ln	Design LOS		
S	*69.5*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*22.9*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing AM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2129*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

'culate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

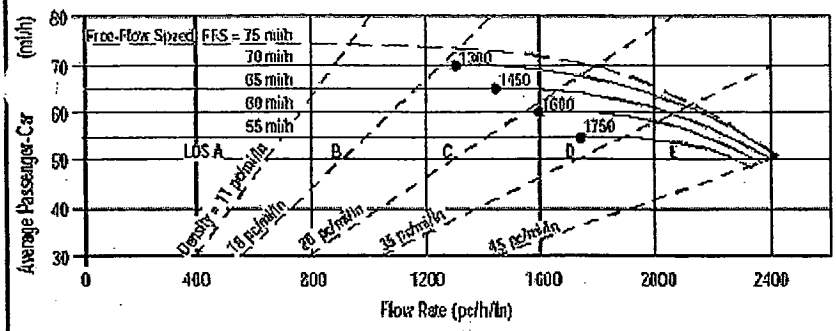
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1329*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*19.0*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*Existing PM*	Analysis Year	*2005*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3111*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1943*	pc/h/ln	Design LOS	
S	*65.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*29.5*	pc/mi/ln	S	mi/h
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 3

EXISTING (2005) CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

INTERSECTION LEVEL OF SERVICE CALCULATIONS

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/22/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description

East/West Street: Avenue 18-1/2	North/South Street: 99 SB offramp / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		227	31	14	142	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	257	35	15	161	0
Percent Heavy Vehicles	0	--	--	22	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	29		60	9	38	51
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	32	0	68	10	43	57
Percent Heavy Vehicles	20	0	20	37	37	37
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		15	32		68		110	
C (m) (veh/h)		1164	376		723		558	
v/c		0.01	0.09		0.09		0.20	
95% queue length		0.04	0.28		0.31		0.73	
Control Delay (s/veh)		8.1	15.5		10.5		13.0	
LOS		A	C		B		B	
Approach Delay (s/veh)	--	--	12.1			13.0		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/22/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description	
East/West Street: Avenue 18-1/2	North/South Street: 99 SB offramp / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		268	31	17	180	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	304	35	19	204	0
Percent Heavy Vehicles	0	--	--	15	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	15		36	27	36	113
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	17	0	40	30	40	128
Percent Heavy Vehicles	20	0	20	45	45	45
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		19	17		40		198	
C (m) (veh/h)		1151	269		679		534	
v/c		0.02	0.06		0.06		0.37	
95% queue length		0.05	0.20		0.19		1.70	
Control Delay (s/veh)		8.2	19.3		10.6		15.7	
LOS		A	C		B		C	
Approach Delay (s/veh)	--	--	13.2			15.7		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/22/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	125	41			73	22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	142	46	0	0	82	25
Percent Heavy Vehicles	48	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	129	0	20			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	146	0	22	0	0	0
Percent Heavy Vehicles	35	35	35	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	142			168				
C (m) (veh/h)	1241			501				
v/c	0.11			0.34				
95% queue length	0.39			1.46				
Control Delay (s/veh)	8.3			15.8				
LOS	A			C				
Approach Delay (s/veh)	--	--	15.8					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/22/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	100	60			88	8
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	113	68	0	0	100	9
Percent Heavy Vehicles	19	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	175	0	37			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	198	0	42	0	0	0
Percent Heavy Vehicles	20	20	20	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	113			240				
C (m) (veh/h)	1382			571				
v/c	0.08			0.42				
95% queue length	0.27			2.07				
Control Delay (s/veh)	7.8			15.8				
LOS	A			C				
Approach Delay (s/veh)	--	--	15.8					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description	04-837.1 Northfork Casino Alts A, B & C
East/West Street: Avenue 17	North/South Street: SR 99 SB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		164			240	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	186	0	0	272	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				99		27
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	112	0	30
Percent Heavy Vehicles	0	0	0	6	0	6
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						112		30
C (m) (veh/h)						554		757
v/c						0.20		0.04
95% queue length						0.75		0.12
Control Delay (s/veh)						13.1		10.0
LOS						B		A
Approach Delay (s/veh)	--	--				12.5		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description	04-837.1 Northfork Casino Alts A, B & C
East/West Street: Avenue 17	North/South Street: SR 99 SB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		266			181	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	302	0	0	205	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				153		31
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	173	0	35
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						173		35
C (m) (veh/h)						515		821
v/c						0.34		0.04
95% queue length						1.47		0.13
Control Delay (s/veh)						15.5		9.6
LOS						C		A
Approach Delay (s/veh)	--	--				14.5		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	16	248			269	46
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	18	281	0	0	305	52
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	52	0	373			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	59	0	423	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	18		59		423			
C (m) (veh/h)	1202		428		758			
v/c	0.01		0.14		0.56			
95% queue length	0.05		0.47		3.50			
Control Delay (s/veh)	8.0		14.8		15.6			
LOS	A		B		C			
Approach Delay (s/veh)	--	--	15.5					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description	04-837.1 Northfork Casino Alts A, B & C
East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	17	87			467	37
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	19	98	0	0	530	42
Percent Heavy Vehicles	3	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	125	28	95			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	142	31	107	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	19		173		107			
C (m) (veh/h)	996		395		958			
v/c	0.02		0.44		0.11			
95% queue length	0.06		2.17		0.38			
Control Delay (s/veh)	8.7		21.0		9.2			
LOS	A		C		A			
Approach Delay (s/veh)	--	--	16.5					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	W Hutcheson
Agency/Co.	TPG Consulting
Date Performed	8/22/2005
Analysis Time Period	AM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2005

Project Description: 04-837.1 Northfork Casino Alts A, B & C

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		91	97	193	13	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	12	0	229
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				11		202
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	219	14	0	0	103	110
Percent Heavy Vehicles	0	0	0	11	0	11
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		219		241				
C (m) (veh/h)		1322		810				
v/c		0.17		0.30				
95% queue length		0.59		1.25				
Control Delay (s/veh)		8.3		11.3				
LOS		A		B				
Approach Delay (s/veh)	--	--	11.3					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	W Hutcheson
Agency/Co.	TPG Consulting
Date Performed	8/22/2005
Analysis Time Period	PM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2005

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		145	111	218	20	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	27	0	693
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				24		610
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	247	22	0	0	164	126
Percent Heavy Vehicles	0	0	0	5	0	5
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		247		720				
C (m) (veh/h)		1227		758				
v/c		0.20		0.95				
95% queue length		0.75		14.23				
Control Delay (s/veh)		8.7		44.9				
LOS		A		E				
Approach Delay (s/veh)	--	--	44.9					
Approach LOS	--	--	E					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	W Hutcheson
Agency/Co.	TPG Consulting
Date Performed	8/22/2005
Analysis Time Period	AM

Site Information

Intersection	Avenue 12 @ Golden State Blvd
Jurisdiction	Madera County
Analysis Year	2005

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 12 | North/South Street: Golden State Blvd

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	165	236	24	75	255	18
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	179	256	26	81	277	19
Percent Heavy Vehicles	10	--	--	6	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	1	1	0
Configuration	L	T	R	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	70	5	258	10	3	11
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	76	5	280	10	3	11
Percent Heavy Vehicles	12	12	12	5	5	5
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	179	81	81		280	13		11
C (m) (veh/h)	1221	1258	157		759	92		746
v/c	0.15	0.06	0.52		0.37	0.14		0.01
95% queue length	0.51	0.21	2.53		1.71	0.47		0.04
Control Delay (s/veh)	8.5	8.1	50.1		12.5	50.5		9.9
LOS	A	A	F		B	F		A
Approach Delay (s/veh)	--	--	20.9			31.9		
Approach LOS	--	--	C			D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	W Hutcheson
Agency/Co.	TPG Consulting
Date Performed	8/22/2005
Analysis Time Period	PM

Site Information

Intersection	Avenue 12 @ Golden State Blvd
Jurisdiction	Madera County
Analysis Year	2005

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 12 | North/South Street: Golden State Blvd

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	244	399	14	93	266	5
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	265	433	15	101	289	5
Percent Heavy Vehicles	7	--	--	6	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	1	1	0
Configuration	L	T	R	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	149	7	239	19	6	19
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	161	7	259	20	6	20
Percent Heavy Vehicles	7	7	7	7	7	7
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	265	101	168		259	26		20
C (m) (veh/h)	1239	1091	75		612	41		736
v/c	0.21	0.09	2.24		0.42	0.63		0.03
95% queue length	0.81	0.31	15.65		2.10	2.32		0.08
Control Delay (s/veh)	8.7	8.6	687.3		15.1	188.9		10.0
LOS	A	A	F		C	F		B
Approach Delay (s/veh)	--	--	279.6			111.1		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 12 @ SR 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/22/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description

East/West Street: Avenue 12	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	104	400			213	245
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	118	454	0	0	242	278
Percent Heavy Vehicles	3	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	135		50			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	153	0	56	0	0	0
Percent Heavy Vehicles	12	0	12	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT		L		R			
v (veh/h)	118		153		56			
C (m) (veh/h)	1041		207		586			
v/c	0.11		0.74		0.10			
95% queue length	0.38		4.92		0.32			
Control Delay (s/veh)	8.9		59.8		11.8			
LOS	A		F		B			
Approach Delay (s/veh)	--	--	46.9					
Approach LOS	--	--	E					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 12 @ SR 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/22/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1

East/West Street: Avenue 12	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	113	544			217	231
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	128	618	0	0	246	262
Percent Heavy Vehicles	5	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	147		79			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	167	0	89	0	0	0
Percent Heavy Vehicles	9	0	9	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT		L		R			
v (veh/h)	128		167		89			
C (m) (veh/h)	1042		161		477			
v/c	0.12		1.04		0.19			
95% queue length	0.42		8.30		0.68			
Control Delay (s/veh)	8.9		138.3		14.3			
LOS	A		F		B			
Approach Delay (s/veh)	--	--	95.1					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Ave 18 @ Road 23*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*8/24/2005*	Analysis Year	*2005*
Analysis Time Period	*AM*		

Project Description *04-837.1 Northfork Casino Alts A,B,C*

East/West Street: *Avenue 18*	North/South Street: *Road 23*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	110	1	5	81	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	2	7	8	1	7	1
Percent Heavy Vehicles	11	--	--	19	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	2	7	8	1	7	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	5	88	2	16	119	1
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	5		9			17	
C (m) (veh/h)	1450	1369		668			774	
v/c	0.01	0.00		0.01			0.02	
95% queue length	0.03	0.01		0.04			0.07	
Control Delay (s/veh)	7.5	7.6		10.5			9.8	
LOS	A	A		B			A	
Approach Delay (s/veh)	--	--	10.5			9.8		
Approach LOS	--	--	B			A		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	88	2	8	108	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	9	5	1	8	9
Percent Heavy Vehicles	13	--	--	15	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	9	5		8	9
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	8	117	1	15	95	2
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	15	8		18			15	
C (m) (veh/h)	1405	1419		770			714	
v/c	0.01	0.01		0.02			0.02	
95% queue length	0.03	0.02		0.07			0.06	
Control Delay (s/veh)	7.6	7.6		9.8			10.2	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--	9.8			10.2		
Approach LOS	--	--	A			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	105	31	10	73	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	30	8	73	9	3
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	28	8	68	9	3
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	10	79	0	5	114	33
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	10		85			38	
C (m) (veh/h)	1519	1435		665			691	
v/c	0.00	0.01		0.13			0.05	
95% queue length	0.01	0.02		0.44			0.17	
Control Delay (s/veh)	7.4	7.5		11.2			10.5	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	11.2			10.5		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	93	53	15	100	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	56	19	39	16	9
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	52	18	36	15	9
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	16	108	2	3	101	57
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	3	16		64			78	
C (m) (veh/h)	1480	1422		619			659	
v/c	0.00	0.01		0.10			0.12	
95% queue length	0.01	0.03		0.34			0.40	
Control Delay (s/veh)	7.4	7.6		11.5			11.2	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	11.5			11.2		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	72	12	107	111	15
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	78	13	116	120	16
Percent Heavy Vehicles	2	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	0	54	20	2	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	5	0	58	21	2	1
Percent Heavy Vehicles	21	21	21	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	1	116	5		58		24	
C (m) (veh/h)	1448	1491	456		925		449	
v/c	0.00	0.08	0.01		0.06		0.05	
95% queue length	0.00	0.25	0.03		0.20		0.17	
Control Delay (s/veh)	7.5	7.6	13.0		9.2		13.5	
LOS	A	A	B		A		B	
Approach Delay (s/veh)	--	--	9.5			13.5		
Approach LOS	--	--	A			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	98	7	67	58	22
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	2	106	7	72	63	23
Percent Heavy Vehicles	2	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	10	3	137	20	0	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	10	3	148	21	0	1
Percent Heavy Vehicles	4	4	4	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	2	72	10		151		22	
C (m) (veh/h)	1510	1434	591		925		457	
v/c	0.00	0.05	0.02		0.16		0.05	
95% queue length	0.00	0.16	0.05		0.58		0.15	
Control Delay (s/veh)	7.4	7.6	11.2		9.6		13.3	
LOS	A	A	B		A		B	
Approach Delay (s/veh)	--	--	9.7			13.3		
Approach LOS	--	--	A			B		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ellis @ Road 26
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	AM		

Project ID 04-837.1 Northfork Casino Alts A,B,C

East/West Street: Ellis | North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	6	1	6	12	1	28
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	13	608	7	26	321	2
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	13		44		344	337	201	176
% Heavy Vehicles	8		8		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.5		0.3		0.0	0.0	0.1	0.0
Prop. Right-Turns	0.5		0.7		0.0	0.0	0.0	0.0
Prop. Heavy Vehicle	0.1		0.1		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		-0.2		0.1	0.0	0.1	0.0

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.01		0.04		0.31	0.30	0.18	0.16
hd, final value (s)	5.98		5.74		5.10	5.06	5.45	5.37
x, final value	0.02		0.07		0.49	0.47	0.30	0.26
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	4.0		3.7		2.8	2.8	3.2	3.1

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	263		294		594	587	451	426
Delay (s/veh)	9.12		9.17		12.54	12.24	10.52	9.98
LOS	A		A		B	B	B	A
Approach: Delay (s/veh)	9.12		9.17		12.39		10.26	
LOS	A		A		B		B	
Intersection Delay (s/veh)	11.51							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ellis @ Road 26
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2005
Analysis Time Period	PM		

Project ID 04-837.1 Northfork Casino Alts A,B,C

East/West Street: Ellis | North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	1	1	1	34	2	22
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	32	517	48	10	762	38
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	3		61		314	333	424	455
% Heavy Vehicles	2		2		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3		0.6		0.1	0.0	0.0	0.0
Prop. Right-Turns	0.3		0.4		0.0	0.2	0.0	0.1
Prop. Heavy Vehicle	0.0		0.0		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		-0.1		0.1	-0.1	0.0	-0.0

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.00		0.05		0.28	0.30	0.38	0.40
hd, final value (s)	6.66		6.46		5.81	5.65	5.50	5.43
x, final value	0.01		0.11		0.51	0.52	0.65	0.69
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	4.7		4.5		3.5	3.3	3.2	3.1

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	253		311		564	583	647	657
Delay (s/veh)	9.70		10.25		14.34	14.36	17.77	19.13
LOS	A		B		B	B	C	C
Approach: Delay (s/veh)	9.70		10.25		14.35		18.47	
LOS	A		B		B		C	
Intersection Delay (s/veh)	16.47							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Ave15.5 @ Road 23*
ncy/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*8/22/2005*	Analysis Year	*2005*
Analysis Time Period	*AM*		

Project Description	*04-837.1 Northfork Casino Alts A,B,C*
East/West Street: *Avenue 15-1/2*	North/South Street: *Road 23*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*123*	*6*	*1*	*128*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*1*	*1*	*24*	*1*	*23*
Percent Heavy Vehicles	*8*	--	--	*10*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
ume (veh/h)	*1*	*1*	*1*	*23*	*1*	*22*
ak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*139*	*21*	*1*	*133*	*6*
Percent Heavy Vehicles	*2*	*2*	*2*	*15*	*15*	*15*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*1*	*1*		*48*			*3*	
C (m) (veh/h)	*1383*	*1397*		*731*			*694*	
v/c	*0.00*	*0.00*		*0.07*			*0.00*	
95% queue length	*0.00*	*0.00*		*0.21*			*0.01*	
Control Delay (s/veh)	*7.6*	*7.6*		*10.3*			*10.2*	
LOS	*A*	*A*		*B*			*B*	
roach Delay (s/veh)	--	--	*10.3*			*10.2*		
roach LOS	--	--	*B*			*B*		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Ave15.5 @ Road 23*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*8/22/2005*	Analysis Year	*2005*
Analysis Time Period	*PM*		

Project Description	*04-837.1 Northfork Casino Alts A,B,C*
East/West Street: *Avenue 15-1/2*	North/South Street: *Road 23*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*124*	*24*	*1*	*110*	*87*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*2*	*1*	*15*	*3*	*46*
Percent Heavy Vehicles	*17*	--	--	*9*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*1*	*2*	*1*	*14*	*3*	*43*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*119*	*94*	*1*	*134*	*26*
Percent Heavy Vehicles	*67*	*67*	*67*	*2*	*2*	*2*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*1*	*1*		*64*			*4*	
C (m) (veh/h)	*1273*	*1378*		*798*			*534*	
v/c	*0.00*	*0.00*		*0.08*			*0.01*	
95% queue length	*0.00*	*0.00*		*0.26*			*0.02*	
Control Delay (s/veh)	*7.8*	*7.6*		*9.9*			*11.8*	
LOS	*A*	*A*		*A*			*B*	
Approach Delay (s/veh)	--	--	*9.9*			*11.8*		
Approach LOS	--	--	*A*			*B*		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	W Hutcheson
Agency/Co.	TPG Consulting
Date Performed	8/22/2005
Analysis Time Period	AM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2005

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	7	121	26	7	114	21
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	53	13	16	33	31
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	166		152		90		85	
% Heavy Vehicles	5		11		20		15	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0		0.0		0.2		0.2	
Prop. Right-Turns	0.2		0.1		0.2		0.4	
Prop. Heavy Vehicle	0.0		0.1		0.2		0.1	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		0.1		0.3		0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.15		0.14		0.08		0.08	
hd, final value (s)	4.54		4.67		5.07		4.85	
x, final value	0.21		0.20		0.13		0.11	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.5		2.7		3.1		2.9	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	416		402		340		335	
Delay (s/veh)	8.73		8.81		8.80		8.48	
LOS	A		A		A		A	
Approach: Delay (s/veh)	8.73		8.81		8.80		8.48	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.72							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	W Hutcheson
Agency/Co.	TPG Consulting
Date Performed	8/22/2005
Analysis Time Period	PM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2005

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	19	88	44	13	154	51
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	49	80	14	39	82	29
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	162		236		154		162	
% Heavy Vehicles	8		4		6		16	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.1		0.1		0.3		0.3	
Prop. Right-Turns	0.3		0.2		0.1		0.2	
Prop. Heavy Vehicle	0.1		0.0		0.1		0.2	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		-0.1		0.1		0.2	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.14		0.21		0.14		0.14	
hd, final value (s)	5.12		4.96		5.32		5.40	
x, final value	0.23		0.33		0.23		0.24	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.1		3.0		3.3		3.4	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	412		486		404		412	
Delay (s/veh)	9.64		10.34		9.88		10.12	
LOS	A		B		A		B	
Approach: Delay (s/veh)	9.64		10.34		9.88		10.12	
LOS	A		B		A		B	
Intersection Delay (s/veh)	10.03							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Ave 16 @ Schnoor*
ncy/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
ate Performed	*8/24/2005*	Analysis Year	*2005*
Analysis Time Period	*AM*		

Project Description *04-837.1 Northfork Casino Alts A,B,C*

East/West Street: *Avenue 16*	North/South Street: *Schnoor*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	3	7	1	10	12
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	254	5	13	165	17	9
Percent Heavy Vehicles	2	--	--	36	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
ume (veh/h)	234	5	12	152	16	9
ak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	10	13	1	3	7
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	1	1	165		26		272	
C (m) (veh/h)	1592	1414	955		925		945	
v/c	0.00	0.00	0.17		0.03		0.29	
95% queue length	0.00	0.00	0.62		0.09		1.20	
Control Delay (s/veh)	7.3	7.5	9.6		9.0		10.3	
LOS	A	A	A		A		B	
roach Delay (s/veh)	--	--	9.5			10.3		
roach LOS	--	--	A			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Ave 16 @ Schnoor*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*8/24/2005*	Analysis Year	*2005*
Analysis Time Period	*PM*		

Project Description	*04-837.1 Northfork Casino Alts A,B,C*
East/West Street: *Avenue 16*	North/South Street: *Schnoor*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	9	31	2	18	14
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	307	7	27	367	23	23
Percent Heavy Vehicles	13	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	283	7	25	338	22	22
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	2	19	15	1	9	33
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	1	2	367		46		341	
C (m) (veh/h)	1509	1567	906		943		880	
v/c	0.00	0.00	0.41		0.05		0.39	
95% queue length	0.00	0.00	1.98		0.15		1.85	
Control Delay (s/veh)	7.4	7.3	11.7		9.0		11.7	
LOS	A	A	B		A		B	
Approach Delay (s/veh)	--	--	11.4			11.7		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/25/06
Analysis Time Period	AM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2005

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	76	264	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	120	0	4	2	59	125
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	82	286			130	4	66	135
% Heavy Vehicles	3	3			14	14	6	6
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.1	0.1	0.1	0.1
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.5			0.7	-0.5	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.07	0.25			0.12	0.00	0.06	0.12
hd, final value (s)	4.82	4.22			6.29	5.08	5.62	4.90
x, final value	0.11	0.34			0.23	0.01	0.10	0.18
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	2.8	2.2			4.0	2.8	3.3	2.6

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	332	536			380	254	316	385
Delay (s/veh)	8.42	9.34			10.83	7.81	8.97	8.70
LOS	A	A			B	A	A	A
Approach: Delay (s/veh)	9.13				10.74		8.79	
LOS	A				B		A	
Intersection Delay (s/veh)	9.34							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/25/06
Analysis Time Period	PM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2005

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	56	313	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	194	0	6	2	78	224
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	60	340			210	6	86	243
% Heavy Vehicles	2	2			2	2	4	4
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.0	-0.6			0.5	-0.7	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.05	0.30			0.19	0.01	0.08	0.22
hd, final value (s)	5.34	4.74			6.45	5.24	5.91	5.19
x, final value	0.09	0.45			0.38	0.01	0.14	0.35
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	3.3	2.7			4.2	2.9	3.6	2.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	310	590			460	256	336	493
Delay (s/veh)	8.86	11.52			12.99	7.98	9.57	10.65
LOS	A	B			B	A	A	B
Approach: Delay (s/veh)	11.12				12.85		10.37	
LOS	B				B		B	
Intersection Delay (s/veh)	11.26							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/18/06
Analysis Time Period	Existing AM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2005

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		66			4	51
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	189	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	174					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	4	55	0	71	0
Percent Heavy Vehicles	3	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						189		
C (m) (veh/h)						893		
v/c						0.21		
95% queue length						0.80		
Control Delay (s/veh)						10.1		
LOS						B		
Approach Delay (s/veh)	--	--				10.1		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/18/06
Analysis Time Period	Existing PM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2005

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		75			6	91
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	218	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	201					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	6	98	0	81	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						218		
C (m) (veh/h)						862		
v/c						0.25		
95% queue length						1.00		
Control Delay (s/veh)						10.6		
LOS						B		
Approach Delay (s/veh)	--	--				10.6		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/18/06	Analysis Year	2005
Analysis Time Period	Existing AM		

Project Description	04-837.1 Northfork Casino Alts A, B & C
East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		51		174	109	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	55
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						51
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	189	118	0	0	55	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		189			55			
C (m) (veh/h)		1563			1012			
v/c		0.12			0.05			
95% queue length		0.41			0.17			
Control Delay (s/veh)		7.6			8.8			
LOS		A			A			
Approach Delay (s/veh)	--	--	8.8					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/18/06	Analysis Year	2005
Analysis Time Period	Existing PM		

Project Description	04-837.1 Northfork Casino Alts A, B & C
East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		108		201	176	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	98
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						91
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	218	191	0	0	117	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		218			98			
C (m) (veh/h)		1423			935			
v/c		0.15			0.10			
95% queue length		0.54			0.35			
Control Delay (s/veh)		8.0			9.3			
LOS		A			A			
Approach Delay (s/veh)	--	--	9.3					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/18/06
Analysis Time Period	Existing AM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2005

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		51	66		109	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	4	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				4		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	118	0	0	55	71
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			4					
C (m) (veh/h)			780					
v/c			0.01					
95% queue length			0.02					
Control Delay (s/veh)			9.6					
LOS			A					
Approach Delay (s/veh)	--	--	9.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/18/06
Analysis Time Period	Existing PM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2005

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		108	75		176	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	6	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				6		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	191	0	0	117	81
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			6					
C (m) (veh/h)			648					
v/c			0.01					
95% queue length			0.03					
Control Delay (s/veh)			10.6					
LOS			B					
Approach Delay (s/veh)	--	--	10.6					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

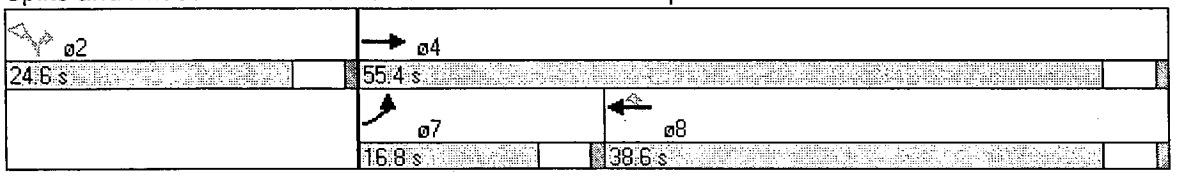
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						42			176			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	66	578	0	0	909	39	267	0	162	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	72	628	0	0	988	42	290	0	176	0	0	0
Lane Group Flow (vph)	72	628	0	0	988	42	290	0	176	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	16.8	55.4	0.0	0.0	38.6	38.6	24.6	0.0	24.6	0.0	0.0	0.0
Total Split (%)	21.0%	69.3%	0.0%	0.0%	48.3%	48.3%	30.8%	0.0%	30.8%	0.0%	0.0%	0.0%
Maximum Green (s)	12.2	50.8			34.0	34.0	20.0		20.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	9.3	59.2			48.0	48.0	12.8		12.8			
Actuated g/C Ratio	0.12	0.74			0.60	0.60	0.16		0.16			
v/c Ratio	0.35	0.24			0.47	0.04	0.56		0.45			
Control Delay	51.8	0.2			11.6	3.7	34.9		8.9			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	51.8	0.2			11.6	3.7	34.9		8.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B	A	C		A			
Approach Delay		5.5			11.2							
Approach LOS		A			B							
Queue Length 50th (ft)	40	0			140	0	70		0			
Queue Length 95th (ft)	78	0			237	16	101		49			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	283	2621			2081	948	835		516			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.25	0.24			0.47	0.04	0.35		0.34			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 44 (55%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 12.3 Intersection LOS: B
Intersection Capacity Utilization 49.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



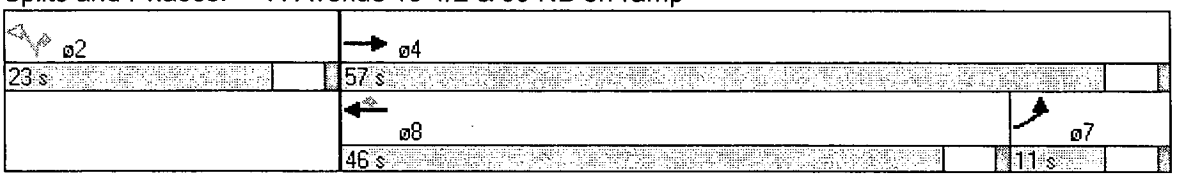
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						62			56			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	84	1352	0	0	1426	57	490	0	278	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	91	1470	0	0	1550	62	533	0	302	0	0	0
Lane Group Flow (vph)	91	1470	0	0	1550	62	533	0	302	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	11.0	57.0	0.0	0.0	46.0	46.0	23.0	0.0	23.0	0.0	0.0	0.0
Total Split (%)	13.8%	71.3%	0.0%	0.0%	57.5%	57.5%	28.8%	0.0%	28.8%	0.0%	0.0%	0.0%
Maximum Green (s)	6.4	52.4			41.4	41.4	18.4		18.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	6.9	54.5			45.7	45.7	17.5		17.5			
Actuated g/C Ratio	0.09	0.68			0.57	0.57	0.22		0.22			
v/c Ratio	0.59	0.61			0.77	0.07	0.72		0.78			
Control Delay	41.7	2.0			17.7	3.0	34.8		39.1			
Queue Delay	0.0	0.7			0.0	0.0	0.0		0.0			
Total Delay	41.7	2.8			17.7	3.0	34.8		39.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B	A	C		D			
Approach Delay		5.1			17.2							
Approach LOS		A			B							
Queue Length 50th (ft)	51	50			323	0	124		114			
Queue Length 95th (ft)	m64	56			422	17	176		#228			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	155	2413			2023	932	808		415			
Starvation Cap Reductn	0	553			0	0	0		0			
Spillback Cap Reductn	0	0			1	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.59	0.79			0.77	0.07	0.66		0.73			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 32 (40%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 16.4 Intersection LOS: B
Intersection Capacity Utilization 69.7% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



Existing Alts A, B, C AM
5: Avenue 15-1/2 & 99 SB off-ramp 7/25/2006

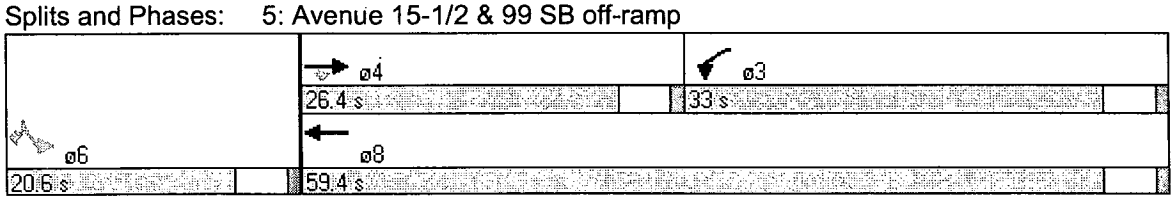
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50		50
Trailing Detector (ft)		0	0	0	0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	1736	3471	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	1736	3471	0	0	0	0	1770	0	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			286									50
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	578	263	361	815	0	0	0	0	66	0	46
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	628	286	392	886	0	0	0	0	72	0	50
Lane Group Flow (vph)	0	628	286	392	886	0	0	0	0	72	0	50
Turn Type			Perm	Prot						custom		custom
Protected Phases		4		3	8							
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6		6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0		4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6		20.6
Total Split (s)	0.0	26.4	26.4	33.0	59.4	0.0	0.0	0.0	0.0	20.6	0.0	20.6
Total Split (%)	0.0%	33.0%	33.0%	41.3%	74.3%	0.0%	0.0%	0.0%	0.0%	25.8%	0.0%	25.8%
Maximum Green (s)		21.8	21.8	28.4	54.8					16.0		16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6		3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0		1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min		Min
Walk Time (s)		5.0	5.0		5.0					5.0		5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0		11.0
Pedestrian Calls (#/hr)		0	0		0					0		0
Act Effct Green (s)		29.9	29.9	29.0	62.9					9.1		9.1
Actuated g/C Ratio		0.37	0.37	0.36	0.79					0.11		0.11
v/c Ratio		0.47	0.37	0.62	0.32					0.36		0.22
Control Delay		21.0	4.1	21.1	0.8					37.0		12.2
Queue Delay		0.0	0.0	0.2	0.1					0.0		0.0
Total Delay		21.0	4.1	21.3	0.9					37.0		12.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A					D		B
Approach Delay		15.7			7.2							
Approach LOS		B			A							
Queue Length 50th (ft)		122	0	152	2					34		0
Queue Length 95th (ft)		182	50	238	6					70		29
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1324	771	629	2730					367		368
Starvation Cap Reductn		0	0	19	632					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.47	0.37	0.64	0.42					0.20		0.14

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 45 (56%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 11.6 Intersection LOS: B
Intersection Capacity Utilization 49.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



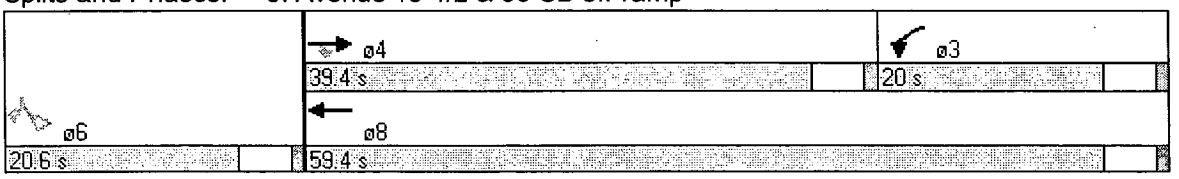
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50		50
Trailing Detector (ft)		0	0	0	0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	1770	3539	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	1770	3539	0	0	0	0	1770	0	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			330									34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1266	304	276	1640	0	0	0	0	170	0	63
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1376	330	300	1783	0	0	0	0	185	0	68
Lane Group Flow (vph)	0	1376	330	300	1783	0	0	0	0	185	0	68
Turn Type			Perm	Prot						custom		custom
Protected Phases		4		3	8							
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6		6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0		4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6		20.6
Total Split (s)	0.0	39.4	39.4	20.0	59.4	0.0	0.0	0.0	0.0	20.6	0.0	20.6
Total Split (%)	0.0%	49.3%	49.3%	25.0%	74.3%	0.0%	0.0%	0.0%	0.0%	25.8%	0.0%	25.8%
Maximum Green (s)		34.8	34.8	15.4	54.8					16.0		16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6		3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0		1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min		Min
Walk Time (s)		5.0	5.0		5.0					5.0		5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0		11.0
Pedestrian Calls (#/hr)		0	0		0					0		0
Act Effct Green (s)		38.6	38.6	16.0	58.6					13.4		13.4
Actuated g/C Ratio		0.48	0.48	0.20	0.73					0.17		0.17
v/c Ratio		0.81	0.35	0.85	0.69					0.62		0.23
Control Delay		23.2	2.9	44.2	3.6					39.9		18.2
Queue Delay		0.0	0.0	0.0	0.4					0.0		0.0
Total Delay		23.2	2.9	44.2	4.0					39.9		18.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	D	A					D		B
Approach Delay		19.3			9.8							
Approach LOS		B			A							
Queue Length 50th (ft)		294	0	158	124					86		15
Queue Length 95th (ft)		#435	43	m#243	151					145		47
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1706	934	354	2591					367		355
Starvation Cap Reductn		0	0	0	330					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.81	0.35	0.85	0.79					0.50		0.19

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 30 (38%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 69.7% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



Existing AM Alts A, B, C
6: 99 NB on-ramp & SR 145 / Madera Ave 7/25/2006

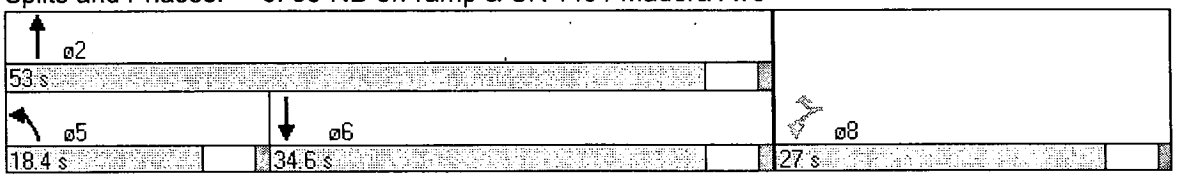
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.901	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1678	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1678	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46					199	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	369	0	42	218	441	0	0	151	411
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	401	0	46	237	479	0	0	164	447
Lane Group Flow (vph)	0	0	0	401	0	46	237	479	0	0	611	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	27.0	0.0	27.0	18.4	53.0	0.0	0.0	34.6	0.0
Total Split (%)	0.0%	0.0%	0.0%	33.8%	0.0%	33.8%	23.0%	66.3%	0.0%	0.0%	43.3%	0.0%
Maximum Green (s)				22.4		22.4	13.8	48.4			30.0	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				21.5		21.5	14.1	50.5			32.4	
Actuated g/C Ratio				0.27		0.27	0.18	0.63			0.40	
v/c Ratio				0.84		0.10	0.76	0.41			0.77	
Control Delay				44.8		7.5	48.0	10.8			22.3	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				44.8		7.5	48.0	10.8			22.3	
LOS				D		A	D	B			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								23.1			22.3	
Approach LOS								C			C	
Queue Length 50th (ft)				178		0	122	159			197	
Queue Length 95th (ft)				#323		23	#223	215			#370	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				516		494	327	1183			809	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.78		0.09	0.72	0.40			0.76	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 6 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 27.3 Intersection LOS: C
Intersection Capacity Utilization 75.7% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave



Existing PM Alts A, B, C
6: 99 NB on-ramp & SR 145 / Madera Ave 7/25/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
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
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.911	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1697	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41					151	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	241	0	38	247	559	0	0	194	374
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	262	0	41	268	608	0	0	211	407
Lane Group Flow (vph)	0	0	0	262	0	41	268	608	0	0	618	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	21.0	0.0	21.0	21.0	59.0	0.0	0.0	38.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	26.3%	0.0%	26.3%	26.3%	73.8%	0.0%	0.0%	47.5%	0.0%
Maximum Green (s)				16.4		16.4	16.4	54.4			33.4	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				15.7		15.7	16.0	56.3			36.4	
Actuated g/C Ratio				0.20		0.20	0.20	0.70			0.46	
v/c Ratio				0.76		0.12	0.76	0.46			0.72	
Control Delay				45.0		9.8	37.9	7.1			20.1	
Queue Delay				0.0		0.0	0.0	0.3			0.0	
Total Delay				45.0		9.8	37.9	7.4			20.1	
LOS				D		A	D	A			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								16.8			20.1	
Approach LOS								B			C	
Queue Length 50th (ft)				120		0	103	162			206	
Queue Length 95th (ft)				#221		25	m#212	173			332	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				380		372	382	1316			863	
Starvation Cap Reductn				0		0	0	264			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.69		0.11	0.70	0.58			0.72	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 65 (81%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 70.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave

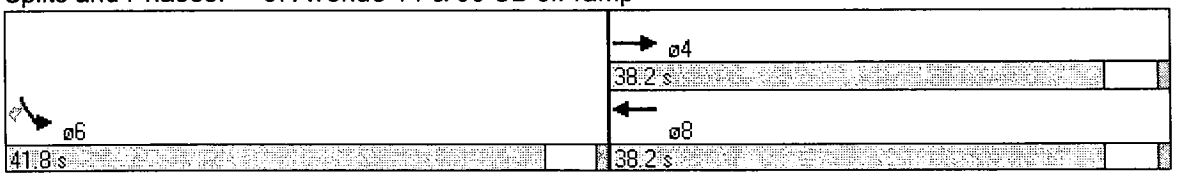
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						301
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	379	384	0	382	277
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	412	417	0	415	301
Lane Group Flow (vph)	0	412	417	0	415	301
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	38.2	38.2	0.0	41.8	41.8
Total Split (%)	0.0%	47.8%	47.8%	0.0%	52.3%	52.3%
Maximum Green (s)		33.6	33.6		37.2	37.2
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		48.0	48.0		24.0	24.0
Actuated g/C Ratio		0.60	0.60		0.30	0.30
v/c Ratio		0.19	0.37		0.79	0.44
Control Delay		8.8	3.4		36.2	4.3
Queue Delay		0.1	0.4		0.0	0.0
Total Delay		8.8	3.8		36.2	4.3
LOS		A	A		D	A
Approach Delay		8.8	3.8		22.8	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)		43	16		190	0
Queue Length 95th (ft)		88	37		241	44
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		2124	1118		828	900
Starvation Cap Reductn		0	296		0	0
Spillback Cap Reductn		543	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.26	0.51		0.50	0.33

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 44 (55%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 13.9 Intersection LOS: B
Intersection Capacity Utilization 48.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp



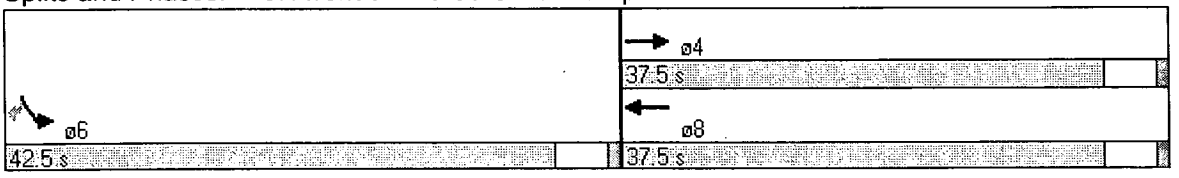
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						113
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	468	262	0	314	104
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	509	285	0	341	113
Lane Group Flow (vph)	0	509	285	0	341	113
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	37.5	37.5	0.0	42.5	42.5
Total Split (%)	0.0%	46.9%	46.9%	0.0%	53.1%	53.1%
Maximum Green (s)		32.9	32.9		37.9	37.9
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		52.4	52.4		19.6	19.6
Actuated g/C Ratio		0.66	0.66		0.24	0.24
v/c Ratio		0.22	0.23		0.79	0.24
Control Delay		6.7	3.3		40.8	5.5
Queue Delay		0.1	0.4		0.0	0.0
Total Delay		6.8	3.8		40.8	5.5
LOS		A	A		D	A
Approach Delay		6.8	3.8		32.0	
Approach LOS		A	A		C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		46	32		160	0
Queue Length 95th (ft)		91	39		220	32
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		2317	1220		852	820
Starvation Cap Reductn		0	543		0	0
Spillback Cap Reductn		745	0		16	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.32	0.42		0.41	0.14

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 37.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp



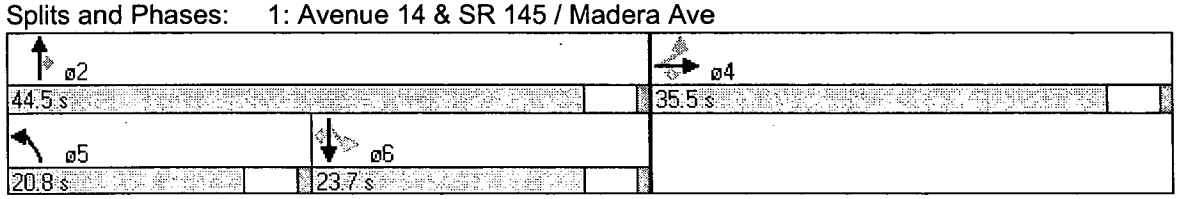
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.966					0.950				0.998	
Satd. Flow (prot)	0	1748	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted		0.966					0.950				0.931	
Satd. Flow (perm)	0	1748	1538	0	0	0	1752	1845	1568	0	3263	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			450						18			280
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	246	101	414	0	0	0	126	413	17	11	251	258
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	267	110	450	0	0	0	137	449	18	12	273	280
Lane Group Flow (vph)	0	377	450	0	0	0	137	449	18	0	285	280
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	35.5	35.5	35.5	0.0	0.0	0.0	20.8	44.5	44.5	23.7	23.7	23.7
Total Split (%)	44.4%	44.4%	44.4%	0.0%	0.0%	0.0%	26.0%	55.6%	55.6%	29.6%	29.6%	29.6%
Maximum Green (s)	30.9	30.9	30.9				16.2	39.9	39.9	19.1	19.1	19.1
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		26.6	26.6				11.8	45.4	45.4		31.8	31.8
Actuated g/C Ratio		0.33	0.33				0.15	0.57	0.57		0.40	0.40
v/c Ratio		0.65	0.55				0.53	0.43	0.02		0.22	0.35
Control Delay		28.4	7.3				38.3	13.1	4.6		7.7	1.4
Queue Delay		57.2	1.5				0.2	0.0	0.0		0.0	0.0
Total Delay		85.5	8.8				38.5	13.1	4.6		7.7	1.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				D	B	A		A	A
Approach Delay		43.8						18.6			4.6	
Approach LOS		D						B			A	
Queue Length 50th (ft)		96	0				64	157	0		25	0
Queue Length 95th (ft)		m157	m79				111	215	10		m44	m12
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		708	890				368	1067	915		1296	791
Starvation Cap Reductn		365	259				0	0	0		0	0
Spillback Cap Reductn		0	0				25	0	0		0	4
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.10	0.71				0.40	0.42	0.02		0.22	0.36

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 56 (70%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 25.1 Intersection LOS: C
Intersection Capacity Utilization 57.9% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave



Existing PM Alts A, B, C
1: Avenue 14 & SR 145 / Madera Ave 7/25/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.967					0.950				0.996	
Satd. Flow (prot)	0	1767	1553	0	0	0	1770	1863	1583	0	3525	1583
Flt Permitted		0.967					0.950				0.831	
Satd. Flow (perm)	0	1767	1553	0	0	0	1770	1863	1583	0	2941	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			407						15			196
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	276	129	374	0	0	0	82	527	14	19	236	180
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	300	140	407	0	0	0	89	573	15	21	257	196
Lane Group Flow (vph)	0	440	407	0	0	0	89	573	15	0	278	196
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	36.3	36.3	36.3	0.0	0.0	0.0	14.6	43.7	43.7	29.1	29.1	29.1
Total Split (%)	45.4%	45.4%	45.4%	0.0%	0.0%	0.0%	18.3%	54.6%	54.6%	36.4%	36.4%	36.4%
Maximum Green (s)	31.7	31.7	31.7				10.0	39.1	39.1	24.5	24.5	24.5
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		28.0	28.0				9.8	44.0	44.0		32.2	32.2
Actuated g/C Ratio		0.35	0.35				0.12	0.55	0.55		0.40	0.40
v/c Ratio		0.71	0.50				0.41	0.56	0.02		0.23	0.26
Control Delay		31.6	8.3				37.4	16.1	5.3		9.5	2.2
Queue Delay		81.8	1.7				0.0	0.0	0.0		0.0	0.0
Total Delay		113.3	10.0				37.4	16.1	5.3		9.5	2.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	B				D	B	A		A	A
Approach Delay		63.7						18.7			6.5	
Approach LOS		E						B			A	
Queue Length 50th (ft)		129	0				41	225	0		33	5
Queue Length 95th (ft)		m236	m79				83	301	9		m46	m11
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		735	884				246	1048	896		1237	779
Starvation Cap Reductn		357	309				0	0	0		0	0
Spillback Cap Reductn		0	0				0	0	0		0	0
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.16	0.71				0.36	0.55	0.02		0.22	0.25

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 31 (39%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 34.9 Intersection LOS: C
Intersection Capacity Utilization 66.9% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2006
Analysis Time Period	AM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	31	140			126	95
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	35	159	0	0	143	107
Percent Heavy Vehicles	37	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				61		20
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	69	0	22
Percent Heavy Vehicles	0	0	0	25	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	35						91	
C (m) (veh/h)	1136						574	
v/c	0.03						0.16	
95% queue length	0.10						0.56	
Control Delay (s/veh)	8.3						12.4	
LOS	A						B	
Approach Delay (s/veh)	--	--				12.4		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2006
Analysis Time Period	PM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	11	176			145	154
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	12	200	0	0	164	175
Percent Heavy Vehicles	34	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				112		21
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	127	0	23
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	12						150	
C (m) (veh/h)	1062						558	
v/c	0.01						0.27	
95% queue length	0.03						1.08	
Control Delay (s/veh)	8.4						13.8	
LOS	A						B	
Approach Delay (s/veh)	--	--				13.8		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2006
Analysis Time Period	AM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	34			45	96
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	2	38	0	0	51	109
Percent Heavy Vehicles	8	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				97		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	110	0	2
Percent Heavy Vehicles	0	0	0	79	0	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	2						112	
C (m) (veh/h)	1383						749	
v/c	0.00						0.15	
95% queue length	0.00						0.52	
Control Delay (s/veh)	7.6						10.6	
LOS	A						B	
Approach Delay (s/veh)	–	--				10.6		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2006
Analysis Time Period	PM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	70			75	99
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	79	0	0	85	112
Percent Heavy Vehicles	5	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				106		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	120	0	2
Percent Heavy Vehicles	0	0	0	48	0	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	5						122	
C (m) (veh/h)	1358						720	
v/c	0.00						0.17	
95% queue length	0.01						0.61	
Control Delay (s/veh)	7.7						11.0	
LOS	A						B	
Approach Delay (s/veh)	–	–				11.0		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 4

EXISTING (2005) CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR 99 SB OFF RAMP/ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

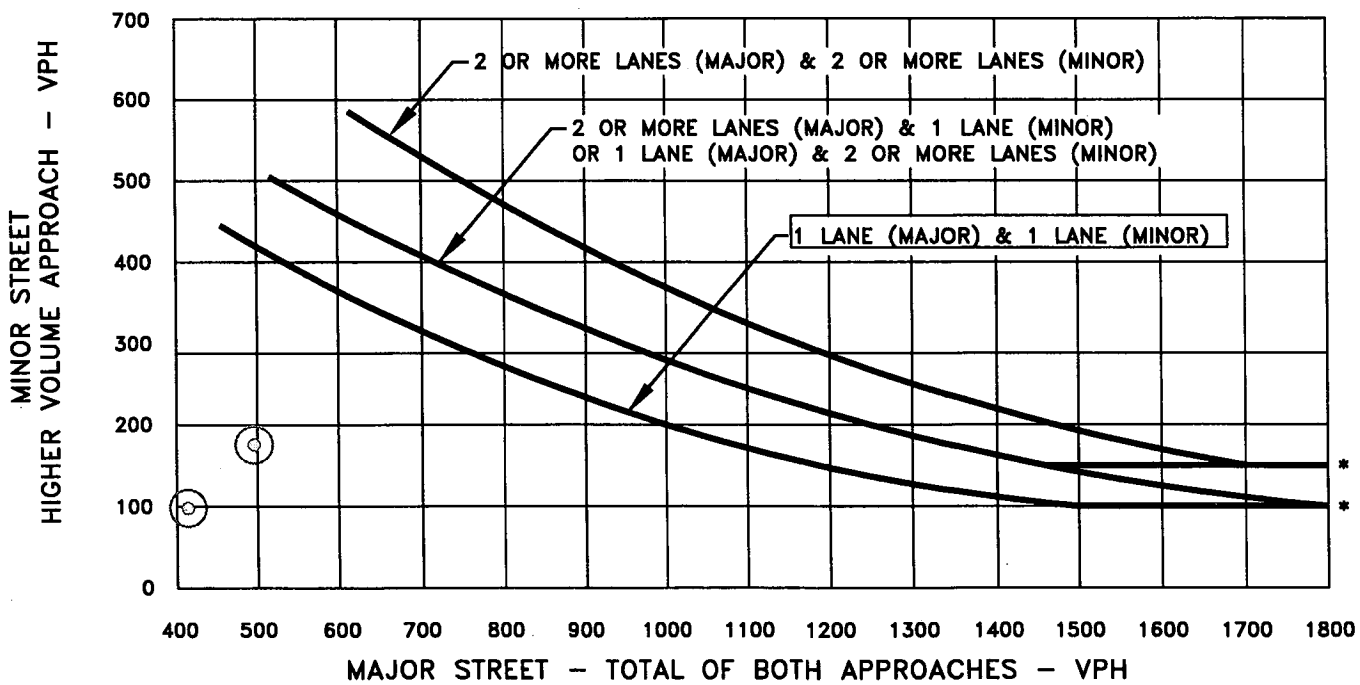
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		414	496			
Highest Approaches – Minor Street	✓		98	176			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR 99-NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

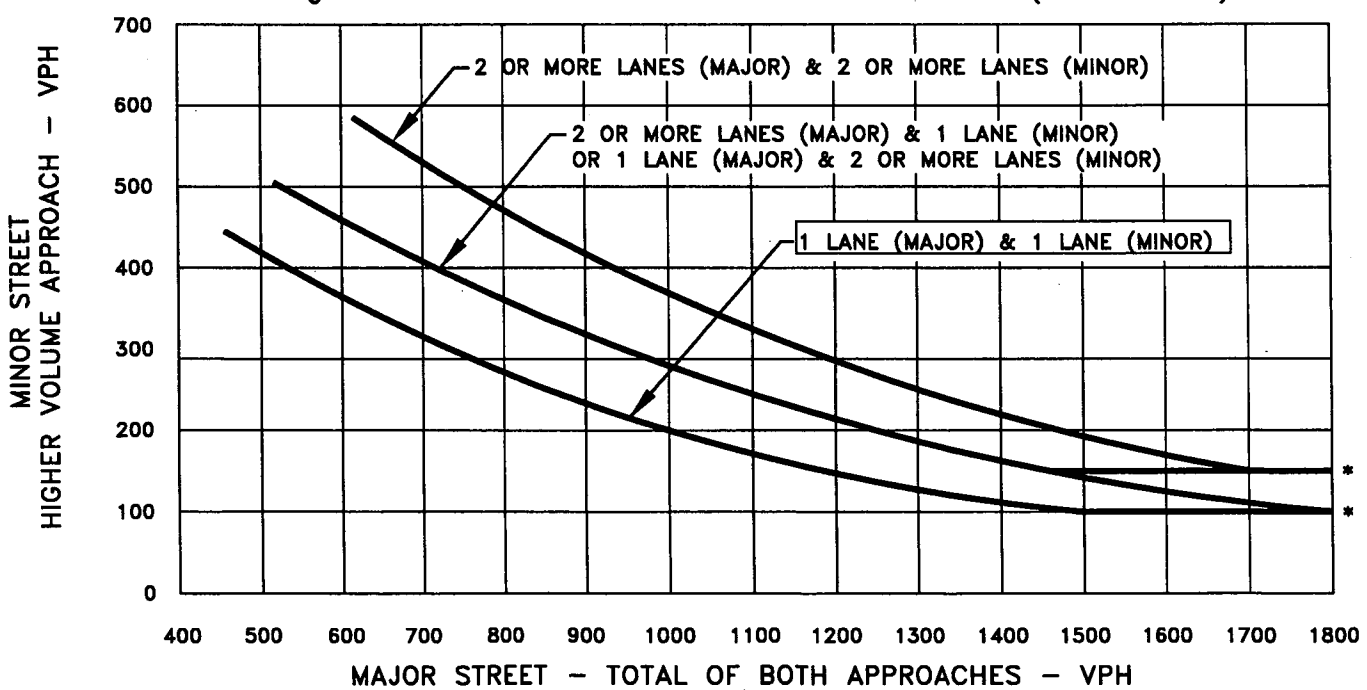
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		261	256			
Highest Approaches – Minor Street	✓		149	212			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: Avenue 17 Critical Approach Speed 45 mph

MINOR STREET: SR-99 SB OFF RAMP Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

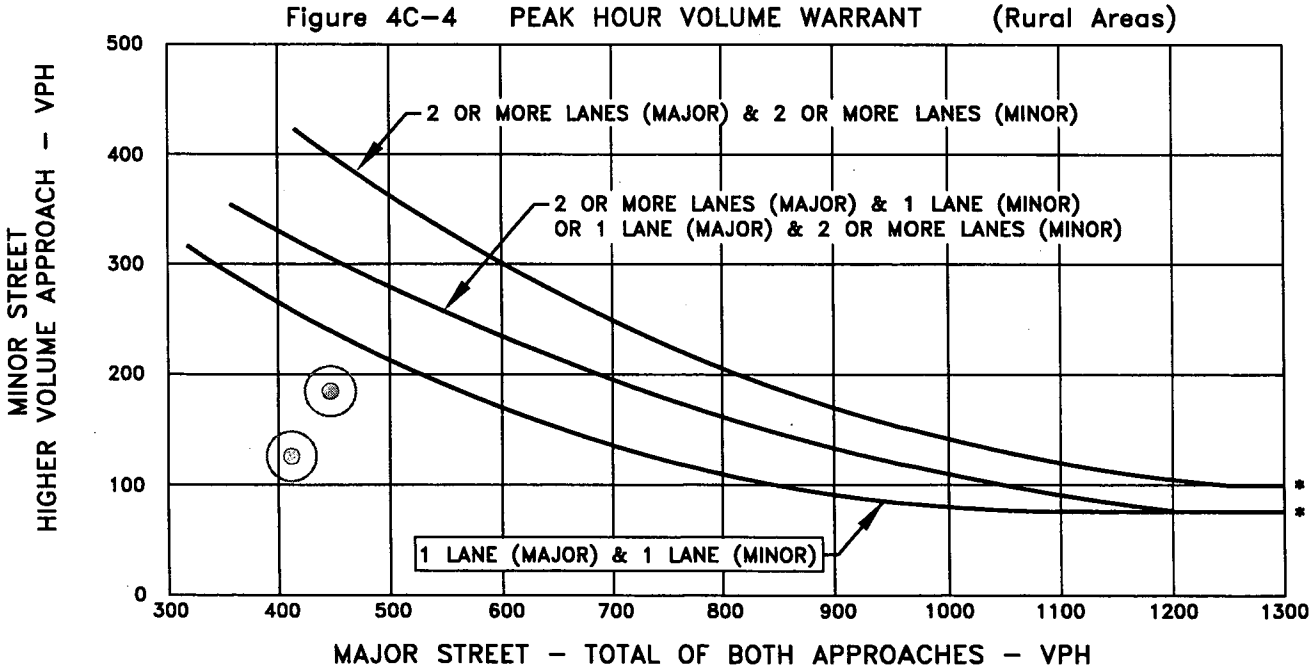
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		412	447				
Highest Approaches – Minor Street	✓		126	185				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: Avenue 17 Critical Approach Speed 45 mph

MINOR STREET: SR-99 NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

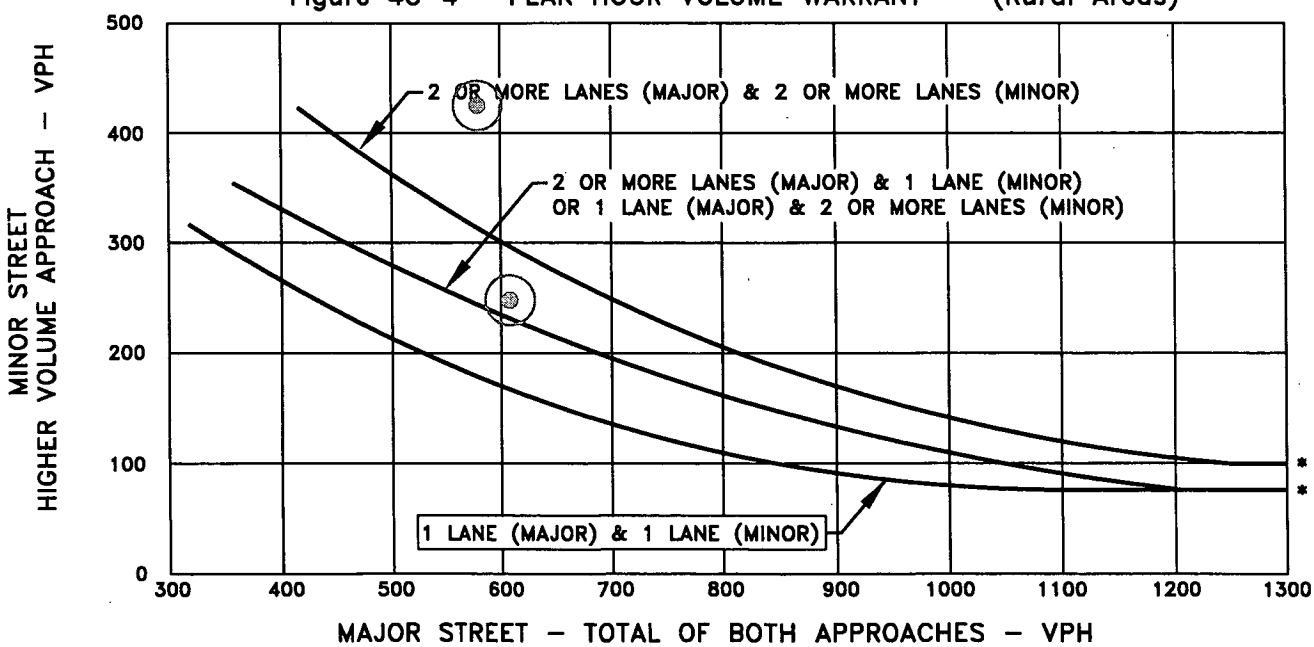
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		608	579				
Highest Approaches – Minor Street	✓		248	425				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 12 Critical Approach Speed 35 mph

MINOR STREET: GOLDEN STATE BOULEVARD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

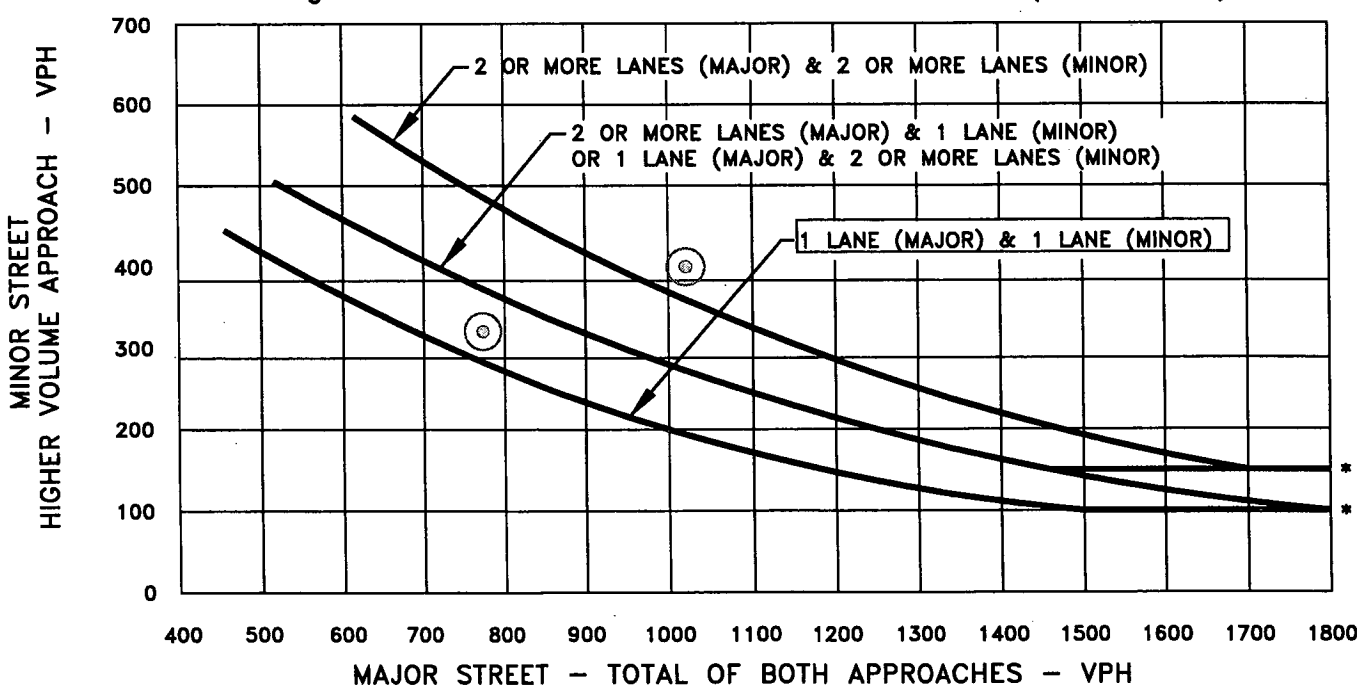
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		773	1021			
Highest Approaches – Minor Street	✓		333	395			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: GOLDEN STATE BOULEVARD Critical Approach Speed 35 mph

MINOR STREET: SR 99 SB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

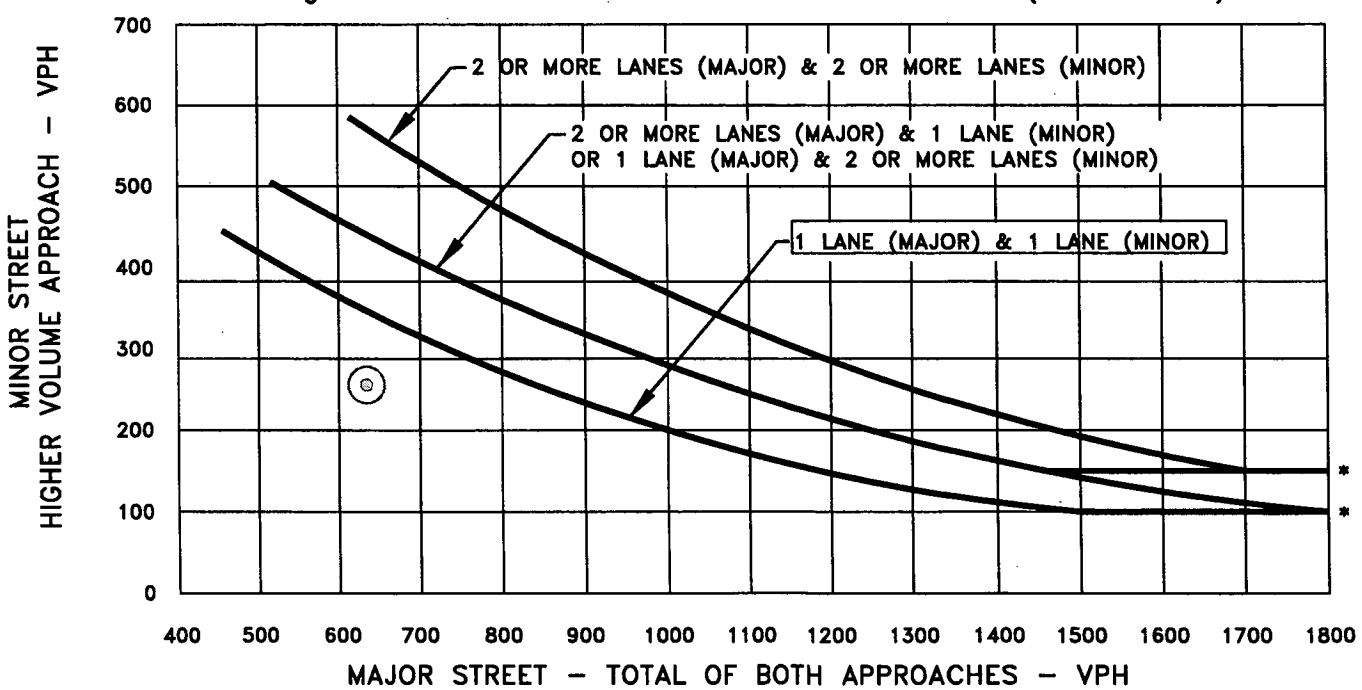
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		394	634			
Highest Approaches – Minor Street	✓		213	256			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 12 Critical Approach Speed 35 mph

MINOR STREET: SR 99 SB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

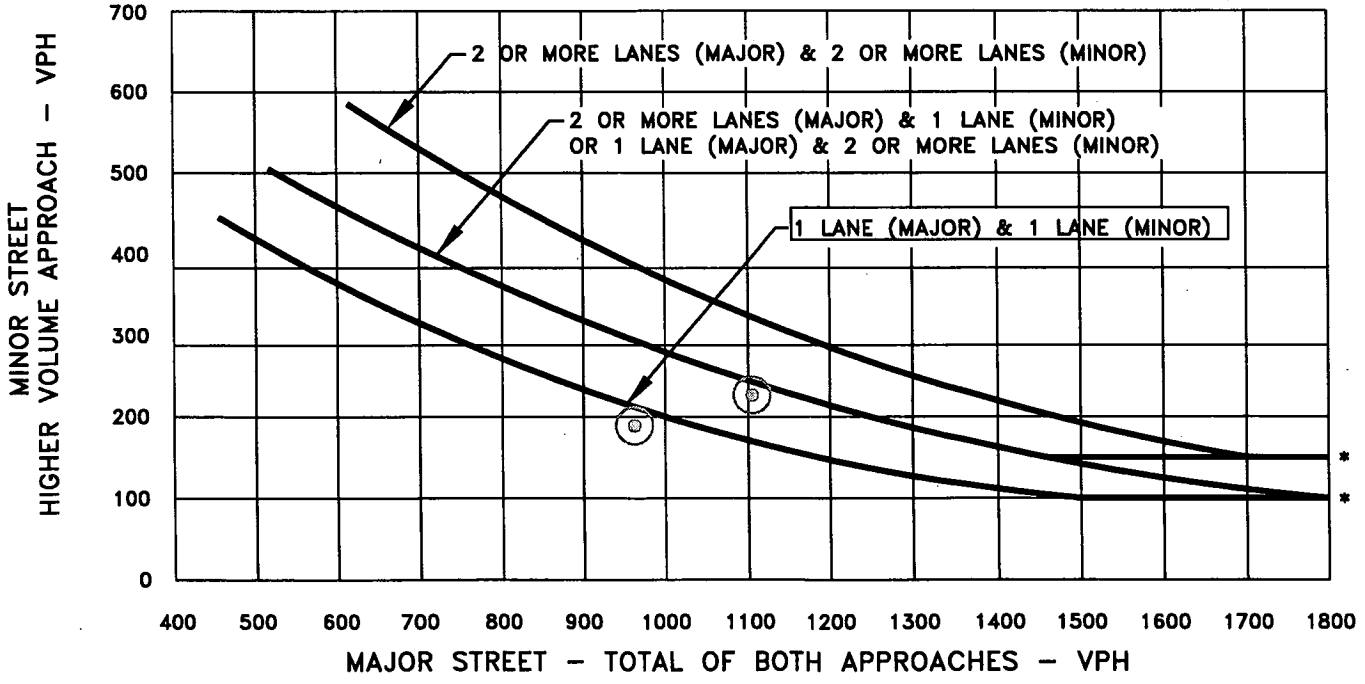
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		962	1105			
Highest Approaches – Minor Street	✓		189	227			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

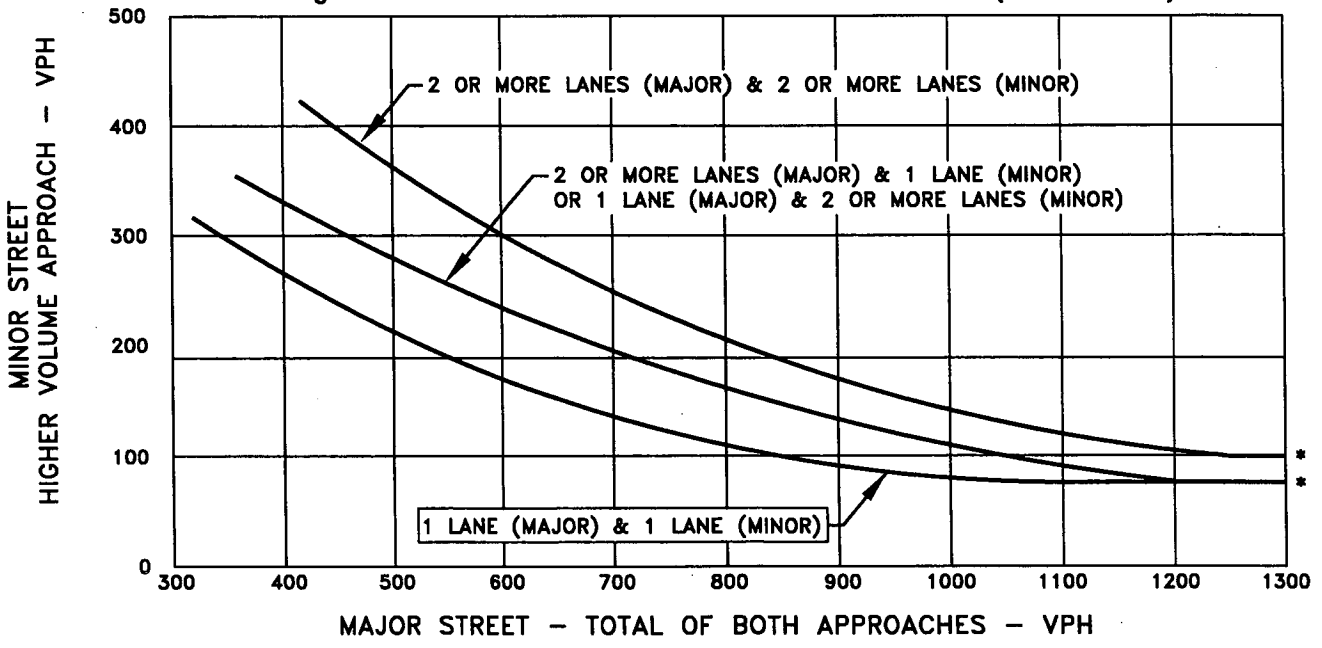
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		213	221				
Highest Approaches – Minor Street	✓		17	17				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 17 Critical Approach Speed 45 mph

MINOR STREET: ROAD 23 Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

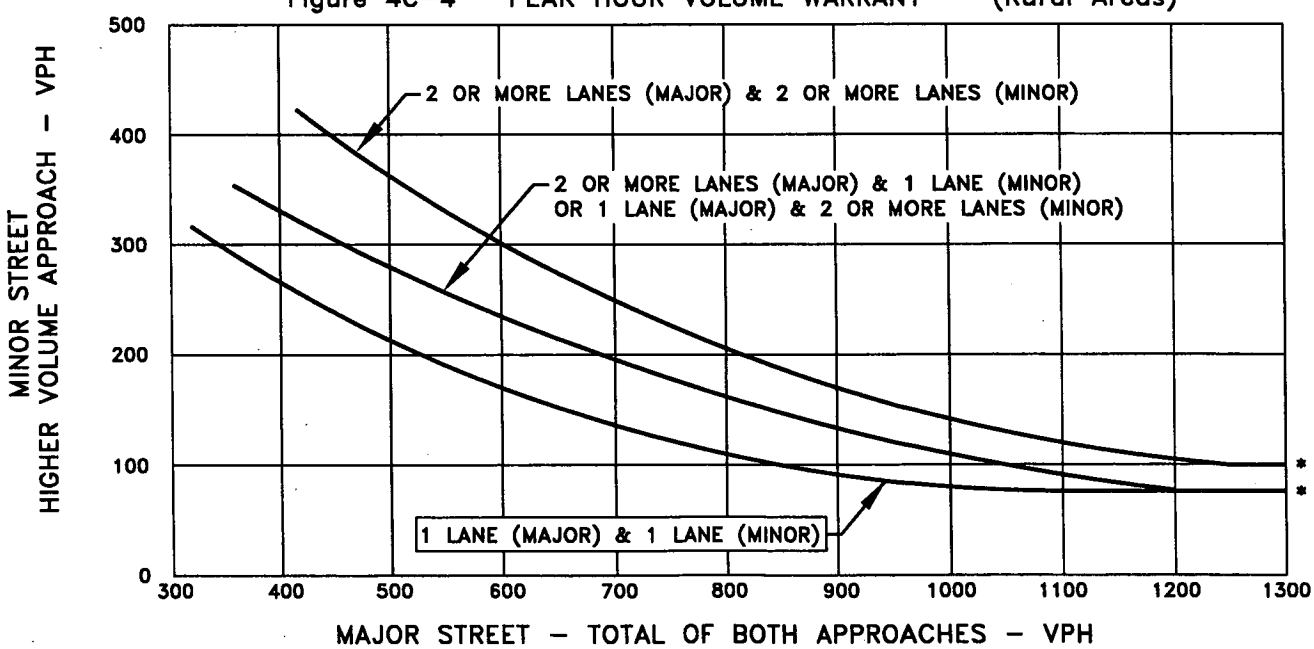
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		223	267				
Highest Approaches – Minor Street	✓		80	72				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 17 Critical Approach Speed 45 mph

MINOR STREET: GOLDEN STATE BOULEVARD Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☒ RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- ☐ URBAN (U)

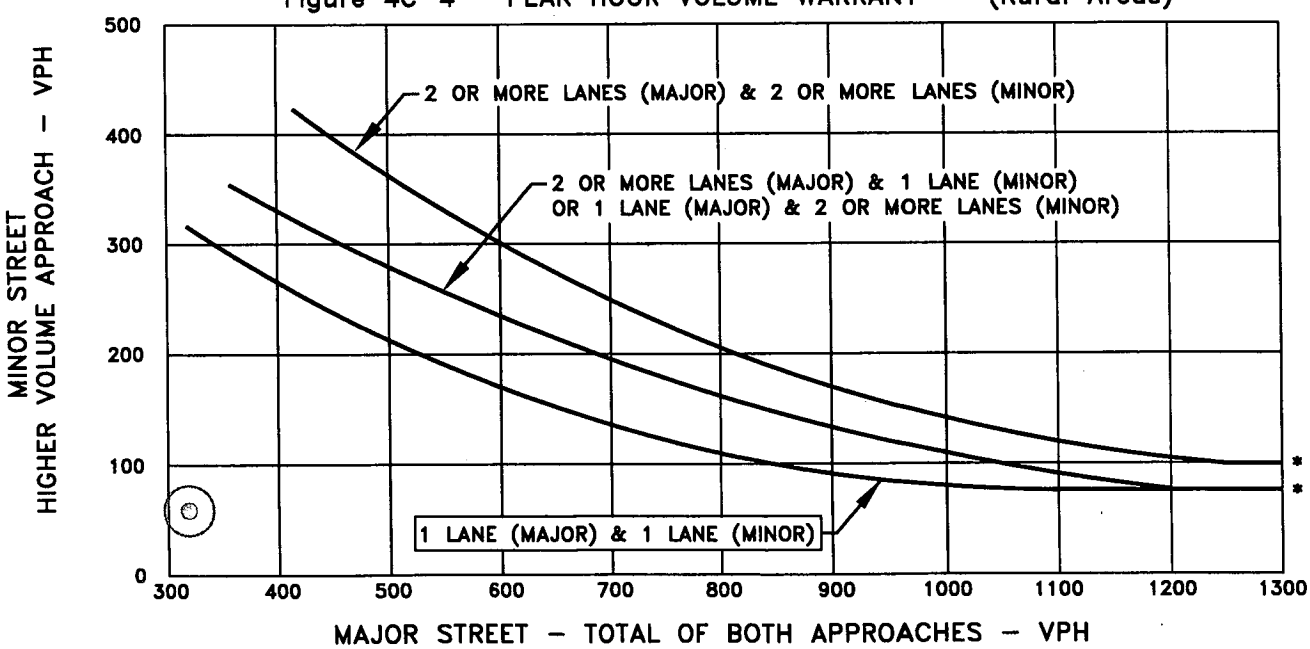
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		319	255				
Highest Approaches – Minor Street	✓		59	150				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 26 Critical Approach Speed 40 mph

MINOR STREET: ELLIS STREET Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

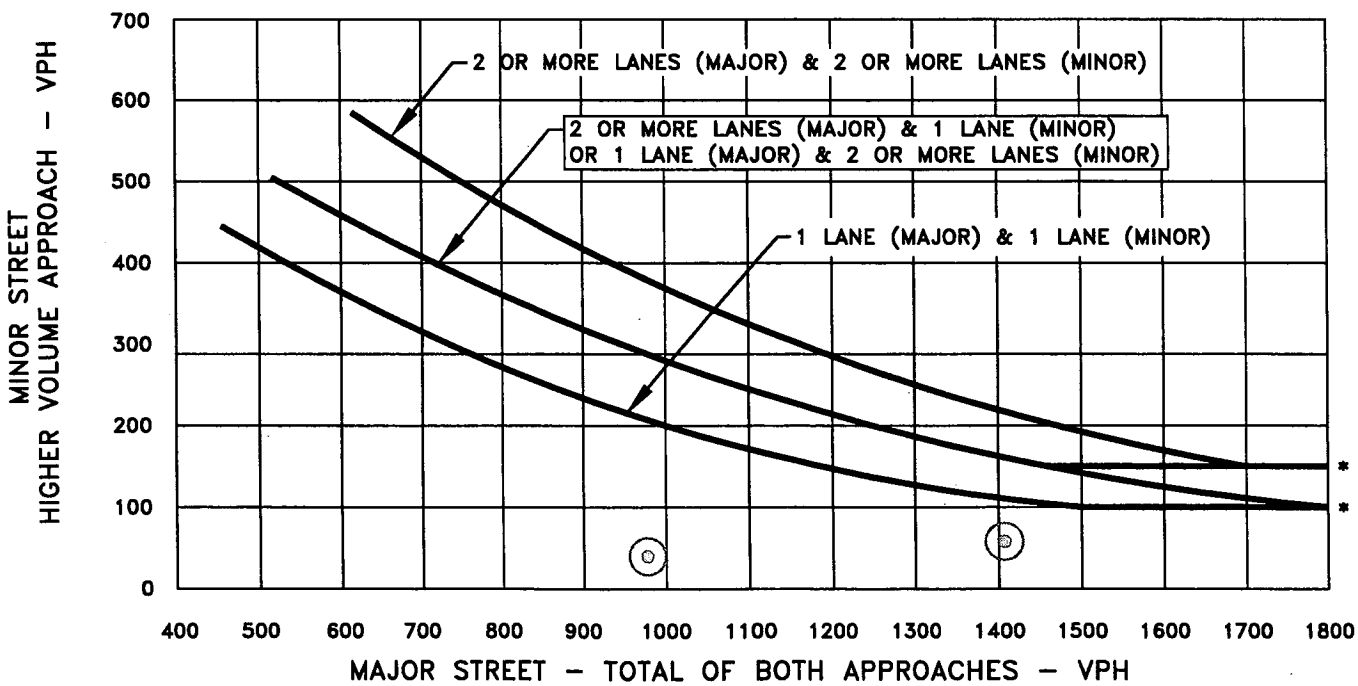
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		977	1407			
Highest Approaches – Minor Street		✓	40	58			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 15 1/2 Critical Approach Speed NPS mph

MINOR STREET: ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

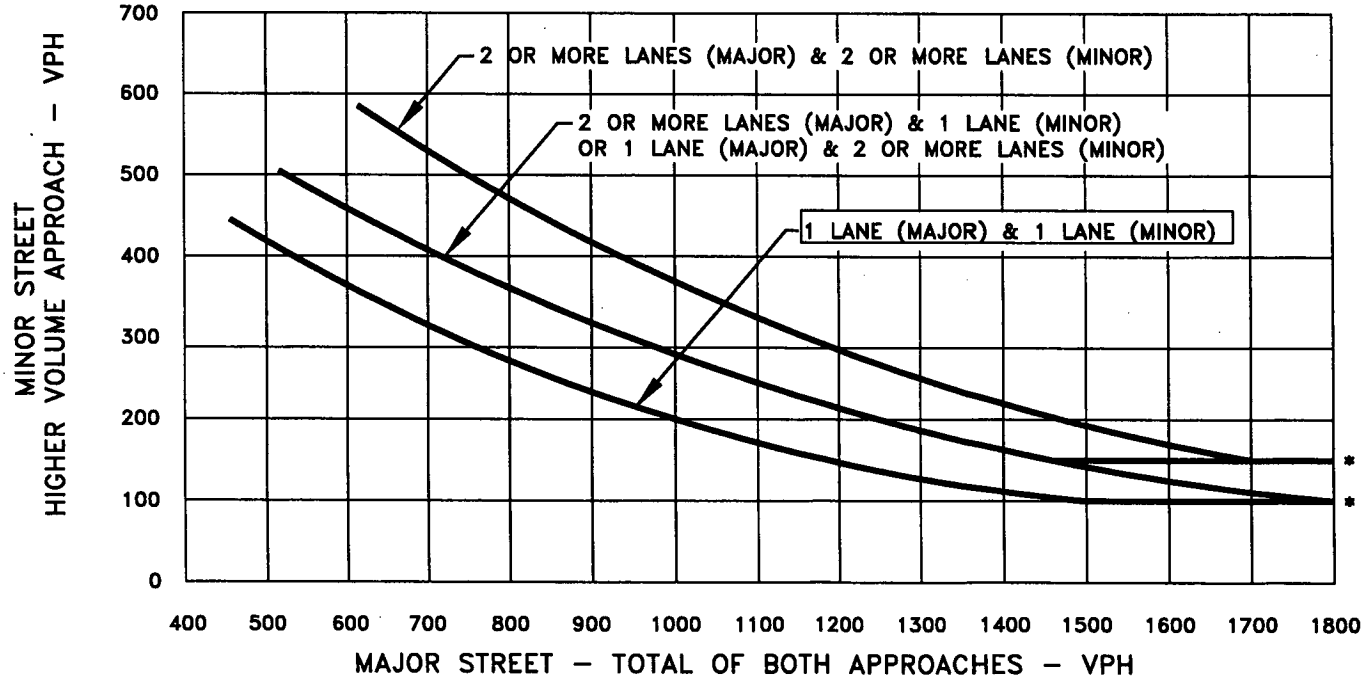
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		277	347			
Highest Approaches – Minor Street	✓		46	60			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 14 Critical Approach Speed NPS mph

MINOR STREET: ROAD 23 Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☐ URBAN (U)

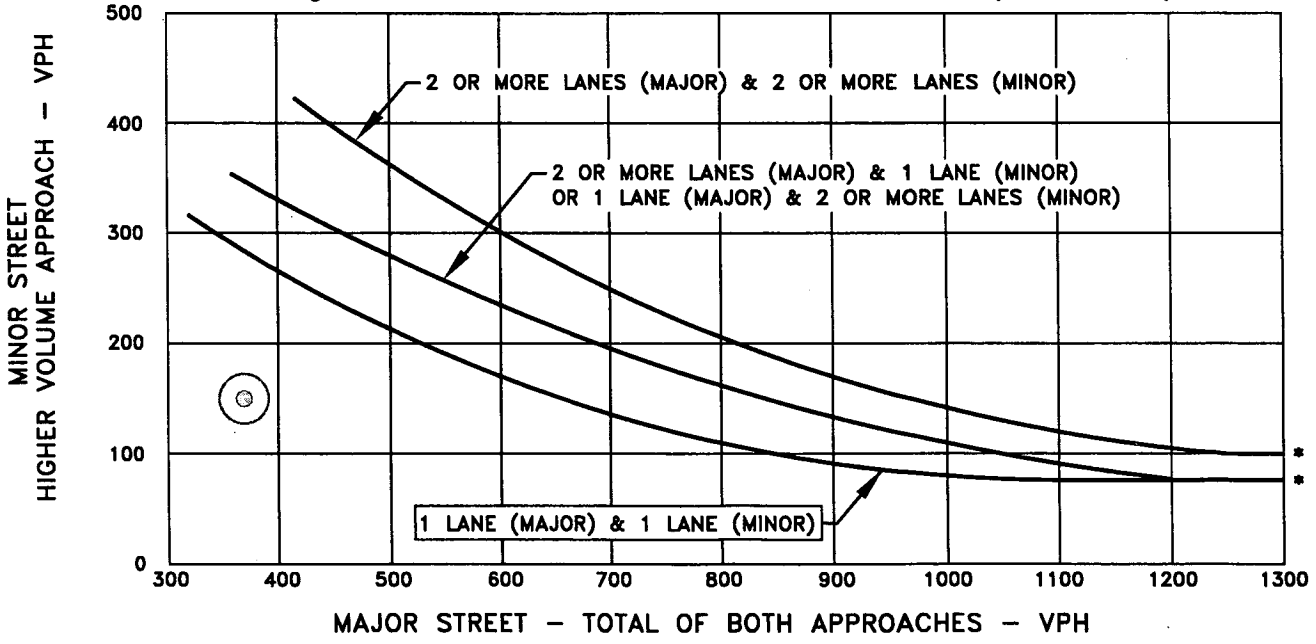
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		296	369				
Highest Approaches – Minor Street	✓		84	150				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 16 Critical Approach Speed 45/40 mph

MINOR STREET: SCHNOOR AVENUE Critical Approach Speed 40/40 mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

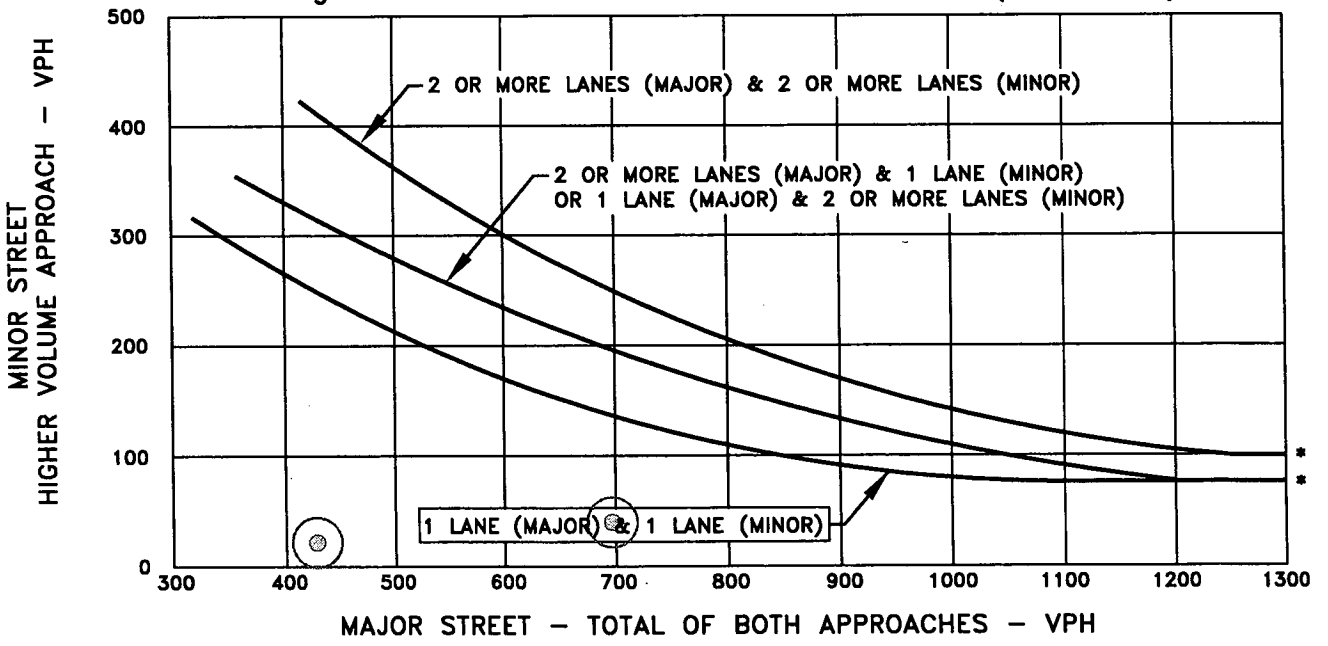
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		428	697				
Highest Approaches – Minor Street	✓		22	40				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 SB Critical Approach Speed NPS mph

MINOR STREET: AVENUE 16 Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

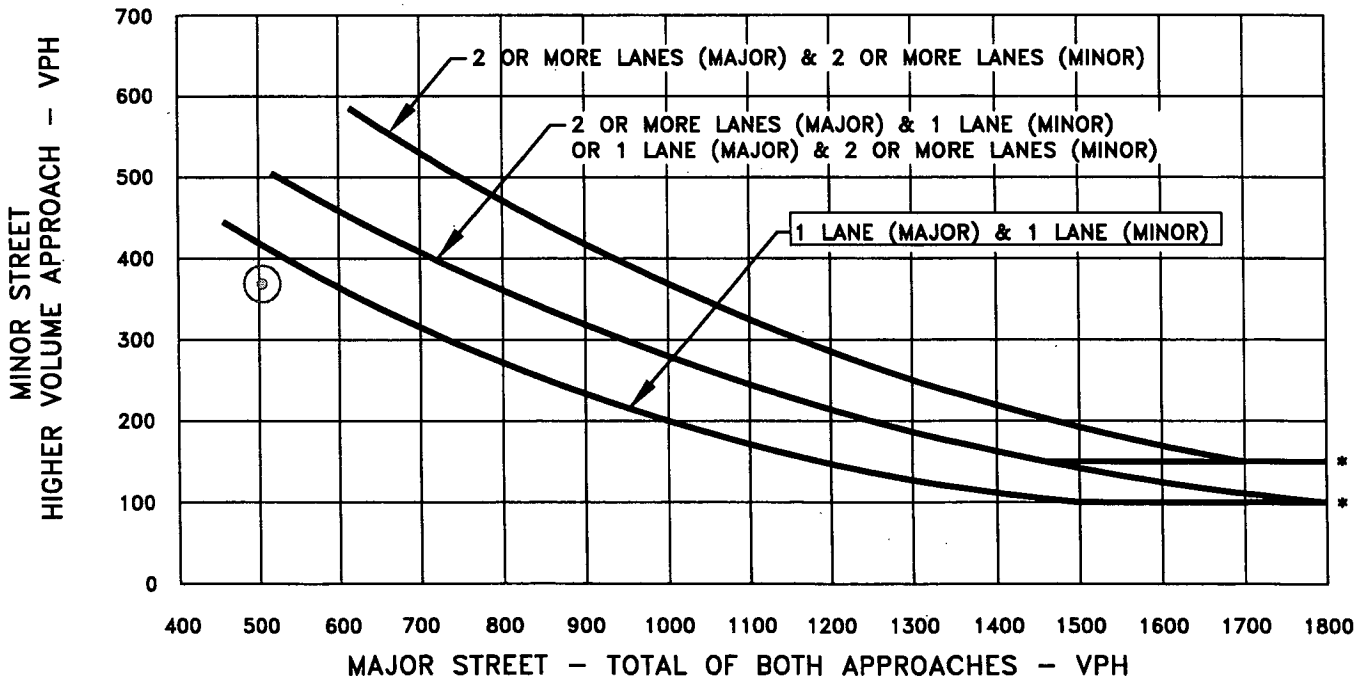
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		340	504			
Highest Approaches – Minor Street	✓		186	369			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 NB OFF RAMP Critical Approach Speed NPS mph

MINOR STREET: AVENUE 16 CONNECTOR Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

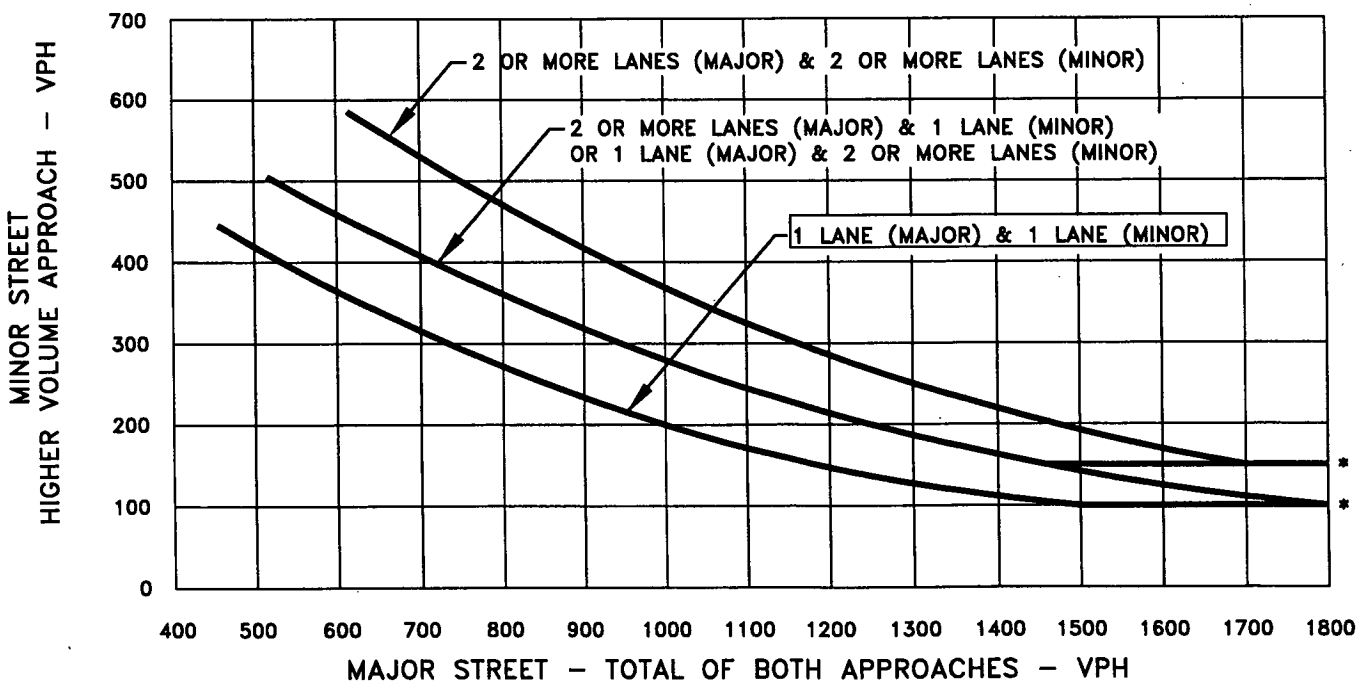
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		174	201			
Highest Approaches – Minor Street	✓		66	97			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 16 Critical Approach Speed 35 mph

MINOR STREET: SR-99 NB ON CONNECTOR Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

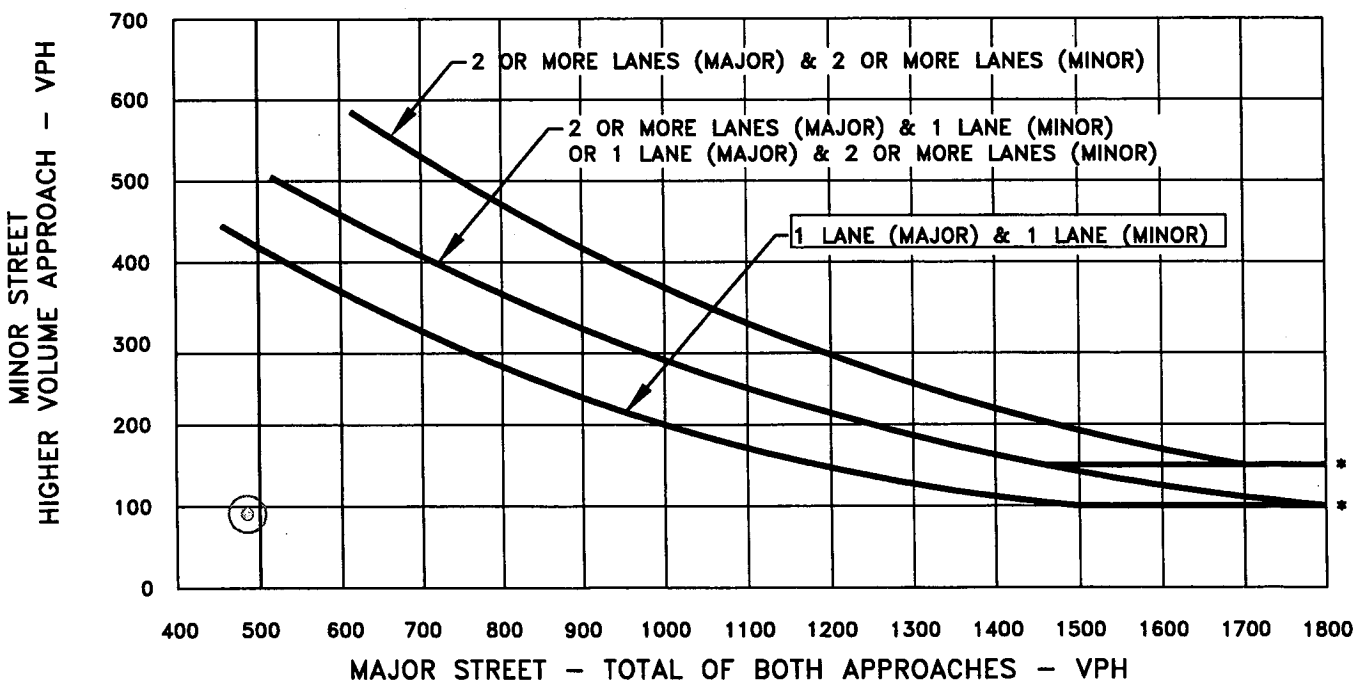
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		334	485			
Highest Approaches – Minor Street	✓		51	91			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 NB ON RAMP Critical Approach Speed NPS mph

MINOR STREET: GATEWAY/AVENUE 16 Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

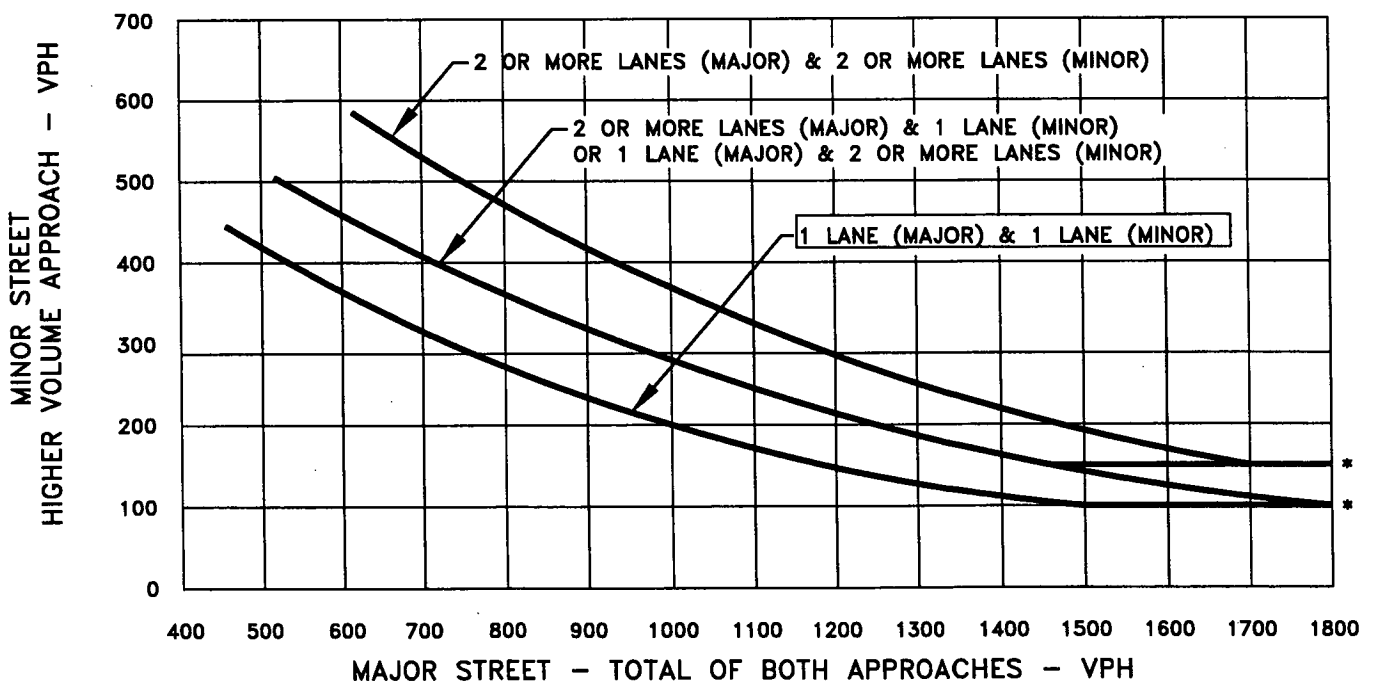
CONDITION: EXISTING

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches - Major Street	✓		226	359			
Highest Approaches - Minor Street	✓		4	6			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: PISTACHIO DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

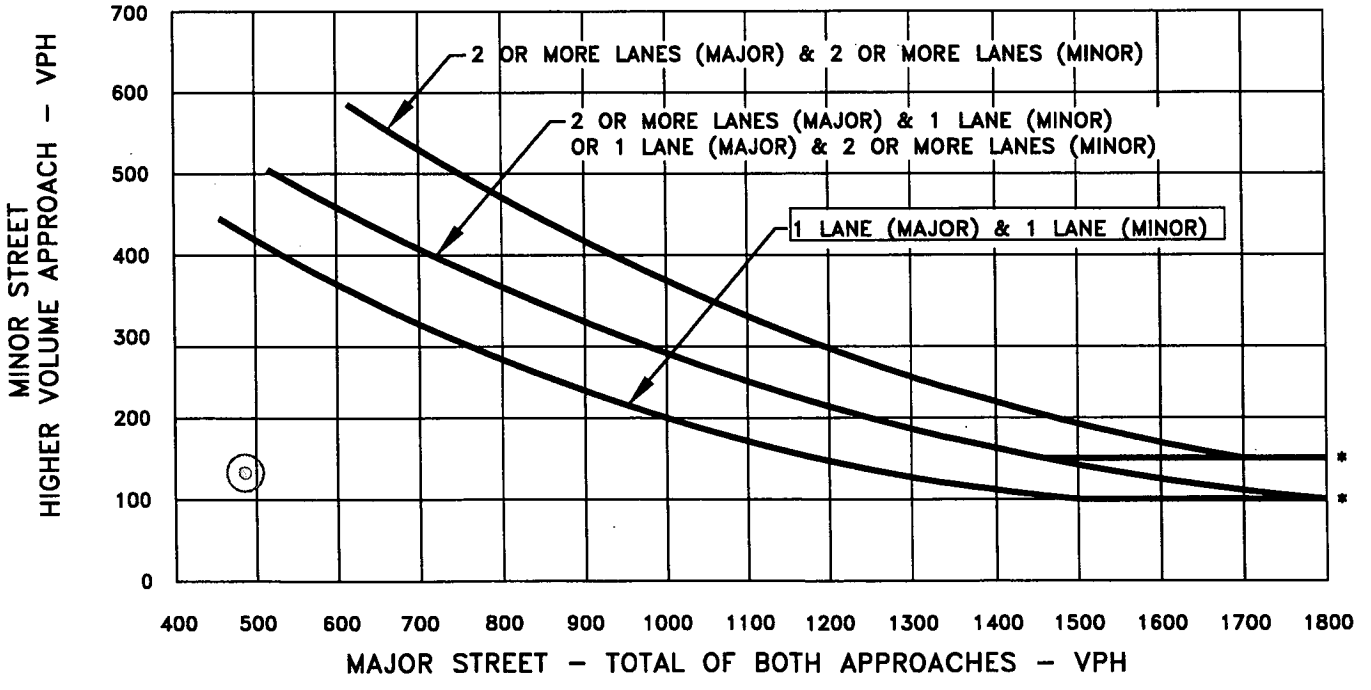
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		392	486			
Highest Approaches – Minor Street	✓		81	133			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: GOLDEN STATE BLVD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

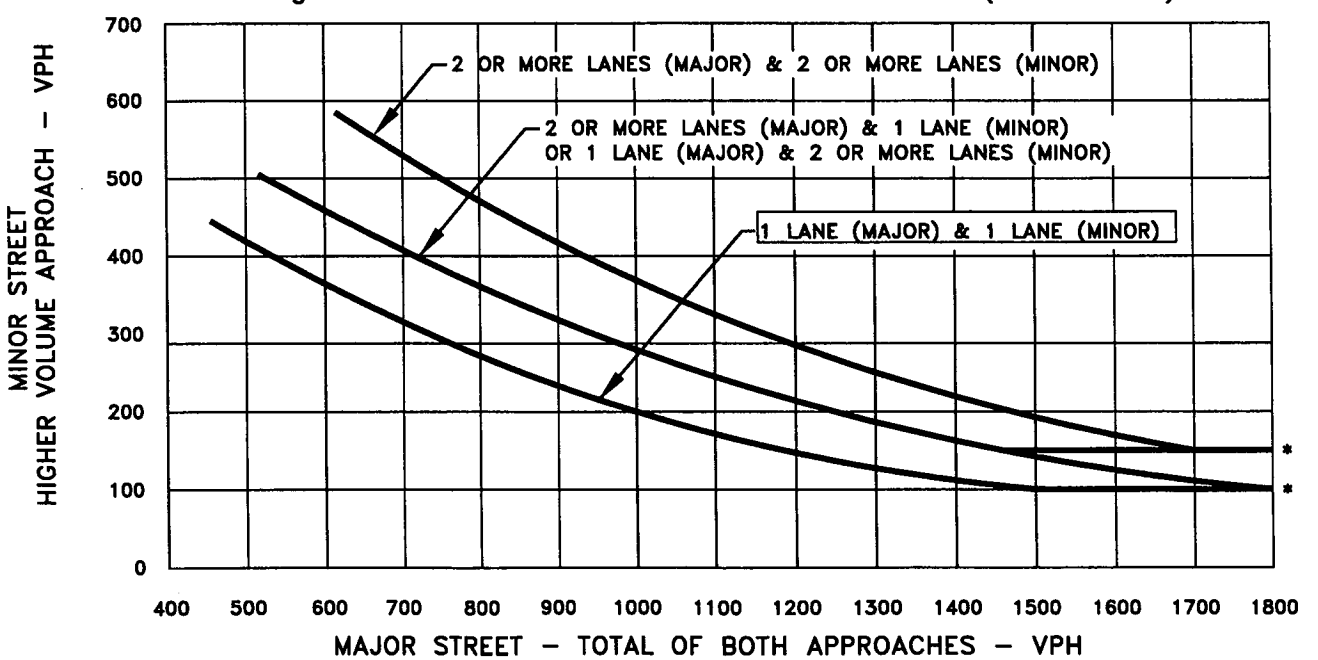
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		177	249			
Highest Approaches – Minor Street	✓		99	108			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

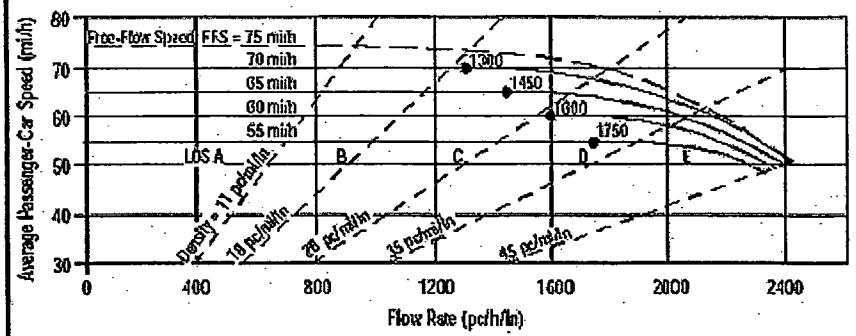
ATTACHMENT VI – C - 5

OPENING DAY (2008) NO PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2975*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

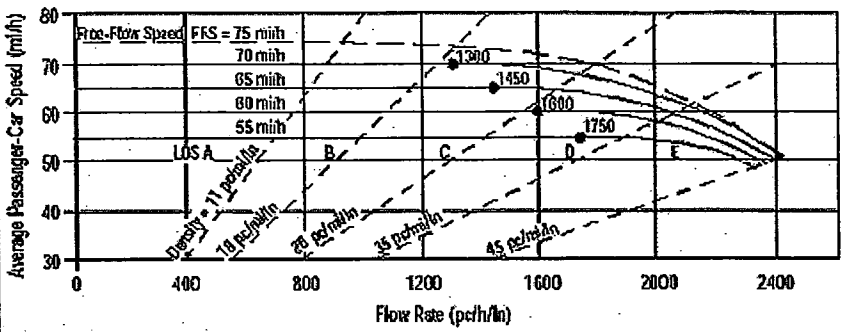
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1858*	pc/h/ln	Design LOS		
S	*67.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*27.7*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*W Hutcheson*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*9/24/2005*
Analysis Time Period	*2008 No Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3083*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1925*	pc/h/ln
S	*66.2*	mi/h
D = v_p / S	*29.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

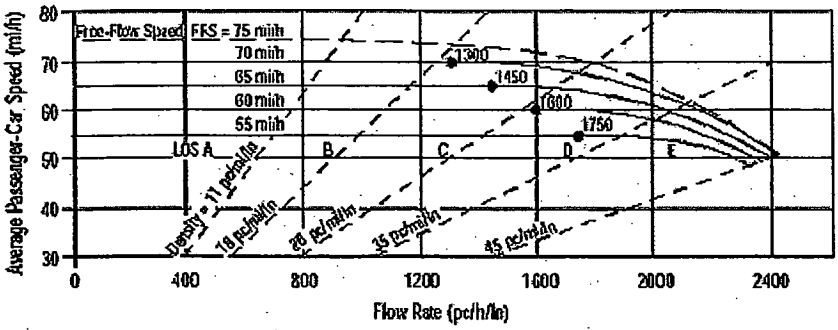
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1538*	pc/h/ln
S	*69.7*	mi/h
D = v_p / S	*22.1*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

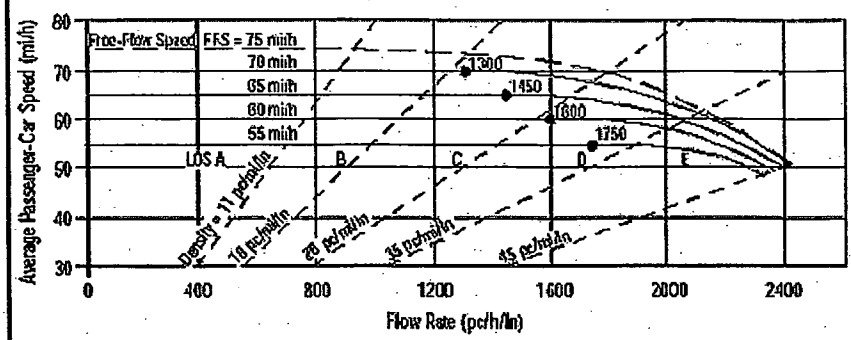
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3715*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

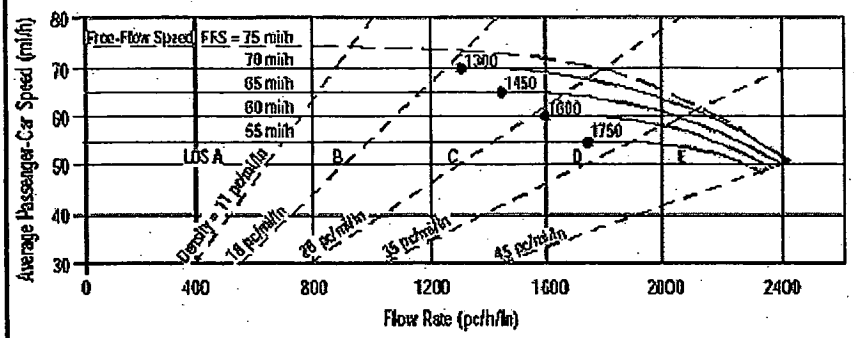
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2320*	pc/h/ln	Design LOS		
S	*56.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*41.2*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2729*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

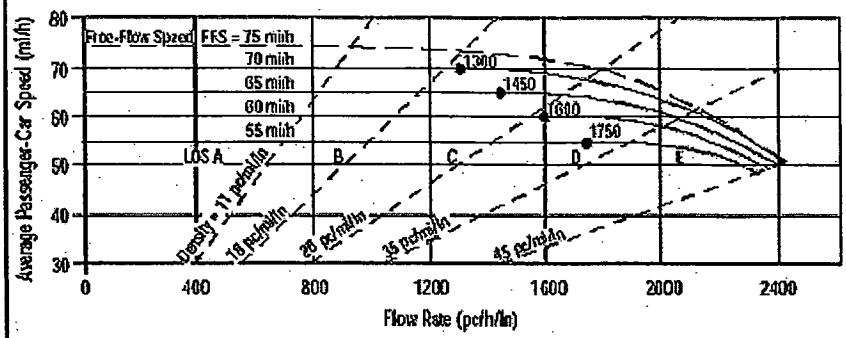
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1704*	pc/h/ln	Design LOS		
S	*68.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*24.8*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2875*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

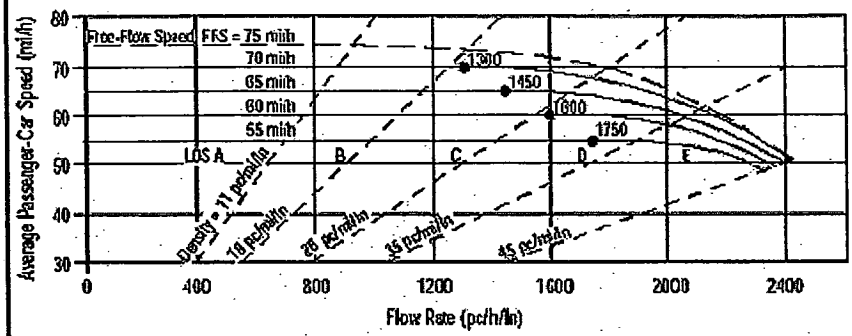
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1795*	pc/h/ln	Design LOS		
S	*67.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*26.4*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☒ Oper.(LOS) ☐ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2279*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

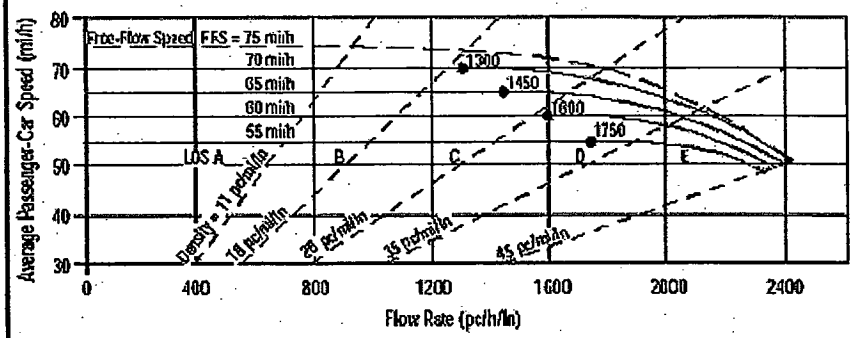
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1423*	pc/h/ln	Design LOS		
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*20.3*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3445*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2151*	pc/h/ln
S	*61.4*	mi/h
D = v_p / S	*35.0*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

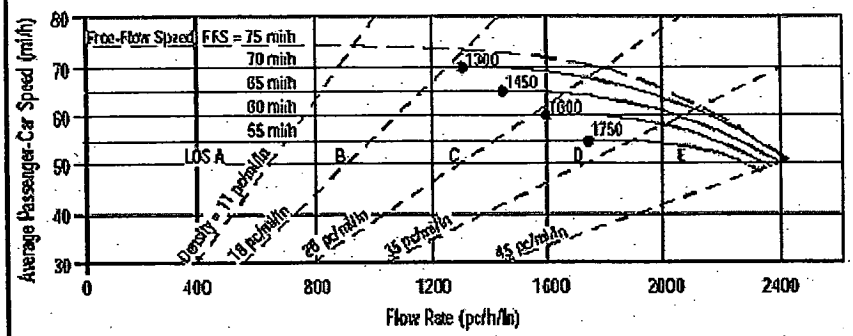
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3321*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

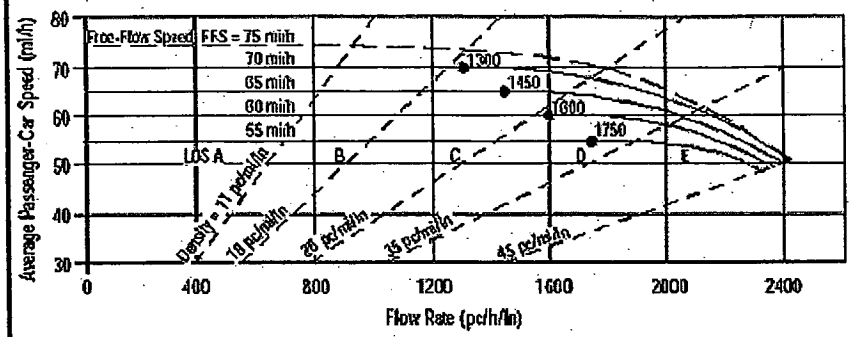
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2074*	pc/h/ln	Design LOS	
S	*63.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*32.8*	pc/mi/ln	S	mi/h
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3994*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

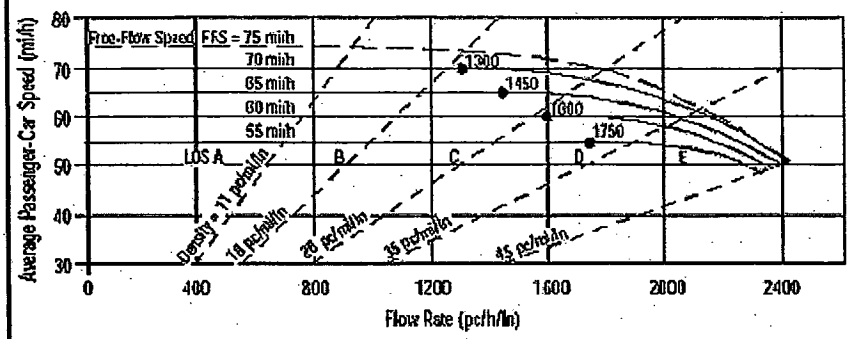
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2494*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2621*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

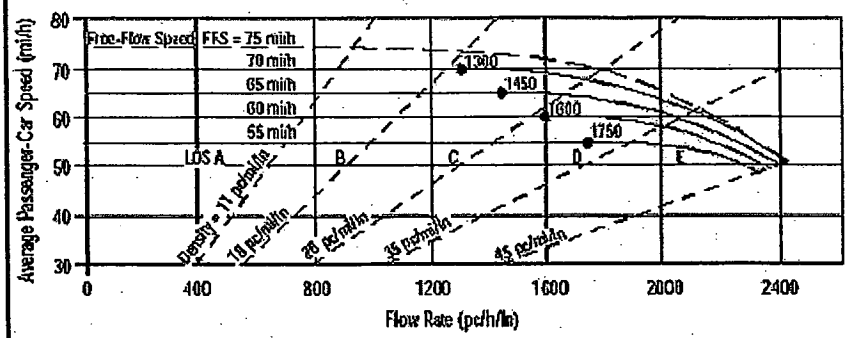
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1637*	pc/h/ln	Design LOS		
S	*69.2*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*23.6*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 No Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4584*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2862*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 6

OPENING DAY (2008) NO PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

INTERSECTION LEVEL OF SERVICE CALCULATIONS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 No Project AM

Site Information

Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1

East/West Street: Avenue 18-1/2 | North/South Street: 99 SB offramp / Road 23

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		355	62	26	256	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	403	70	29	290	0
Percent Heavy Vehicles	0	–	–	29	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	61		109	12	94	66
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	69	0	123	13	106	75
Percent Heavy Vehicles	20	0	20	37	37	37
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		29	69		123		194	
C (m) (veh/h)		962	149		582		332	
v/c		0.03	0.46		0.21		0.58	
95% queue length		0.09	2.13		0.79		3.51	
Control Delay (s/veh)		8.9	48.5		12.8		30.0	
LOS		A	E		B		D	
Approach Delay (s/veh)	–	–	25.6			30.0		
Approach LOS	–	–	D			D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1

East/West Street: Avenue 18-1/2	North/South Street: 99 SB offramp / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		372	66	38	288	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	422	75	43	327	0
Percent Heavy Vehicles	0	–	–	22	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	54		165	36	137	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	61	0	187	40	155	144
Percent Heavy Vehicles	20	0	20	45	45	45
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		43	61		187		339	
C (m) (veh/h)		971	63		566		271	
v/c		0.04	0.97		0.33		1.25	
95% queue length		0.14	4.66		1.44		16.30	
Control Delay (s/veh)		8.9	213.0		14.5		178.0	
LOS		A	F		B		F	
Approach Delay (s/veh)	–	–	63.3			178.0		
Approach LOS	–	–	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	180	53			88	24
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	204	60	0	0	100	27
Percent Heavy Vehicles	48	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	242	0	22			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	275	0	25	0	0	0
Percent Heavy Vehicles	35	35	35	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	204			300				
C (m) (veh/h)	1219			373				
v/c	0.17			0.80				
95% queue length	0.60			6.98				
Control Delay (s/veh)	8.5			44.3				
LOS	A			E				
Approach Delay (s/veh)	–	–	44.3					
Approach LOS	–	–	E					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/29/2006 5:00 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	227	84			117	10
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	257	95	0	0	132	11
Percent Heavy Vehicles	19	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	285	0	46			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	323	0	52	0	0	0
Percent Heavy Vehicles	20	20	20	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	257			375				
C (m) (veh/h)	1342			318				
v/c	0.19			1.18				
95% queue length	0.71			15.94				
Control Delay (s/veh)	8.3			144.0				
LOS	A			F				
Approach Delay (s/veh)	–	–	144.0					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 8/29/2006 5:01 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: SR 99 SB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		587			762	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	667	0	0	865	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				135		62
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	153	0	70
Percent Heavy Vehicles	0	0	0	6	0	6
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						153		70
C (m) (veh/h)						126		347
v/c						1.21		0.20
95% queue length						9.45		0.74
Control Delay (s/veh)						215.7		18.0
LOS						F		C
Approach Delay (s/veh)	--	--				153.6		
Approach LOS	--	--				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: SR 99 SB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1401			1239	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	1592	0	0	1407	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				282		74
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	320	0	84
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						320		84
C (m) (veh/h)						14		165
v/c						22.86		0.51
95% queue length						41.17		2.50
Control Delay (s/veh)						10360		47.5
LOS						F		E
Approach Delay (s/veh)	--	--				8216		
Approach LOS	--	--				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	42	266			739	64
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	47	302	0	0	839	72
Percent Heavy Vehicles	3	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	473	36	271			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	537	40	307	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	47		577		307			
C (m) (veh/h)	744		171		738			
v/c	0.06		3.37		0.42			
95% queue length	0.20		54.71		2.06			
Control Delay (s/veh)	10.2		1124		13.3			
LOS	B		F		B			
Approach Delay (s/veh)	--	--	738.0					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	57	780			1233	194
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	64	886	0	0	1401	220
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	678	0	1011			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	770	0	1148	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	64		770		1148			
C (m) (veh/h)	401		26		343			
v/c	0.16		29.62		3.35			
95% queue length	0.56		96.01		104.74			
Control Delay (s/veh)	15.7		13162		1086			
LOS	C		F		F			
Approach Delay (s/veh)	--	--	5934					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 No Project AM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		89	125	209	25	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	63	0	243
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				56		214
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	237	28	0	0	101	142
Percent Heavy Vehicles	0	0	0	11	0	11
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		237		306				
C (m) (veh/h)		1289		642				
v/c		0.18		0.48				
95% queue length		0.67		2.57				
Control Delay (s/veh)		8.4		15.6				
LOS		A		C				
Approach Delay (s/veh)	--	--	15.6					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 No Project PM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		143	152	246	35	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	177	0	710
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				156		625
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	279	39	0	0	162	172
Percent Heavy Vehicles	0	0	0	5	0	5
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		279		887				
C (m) (veh/h)		1182		550				
v/c		0.24		1.61				
95% queue length		0.92		48.92				
Control Delay (s/veh)		9.0		303.5				
LOS		A		F				
Approach Delay (s/veh)	--	--	303.5					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

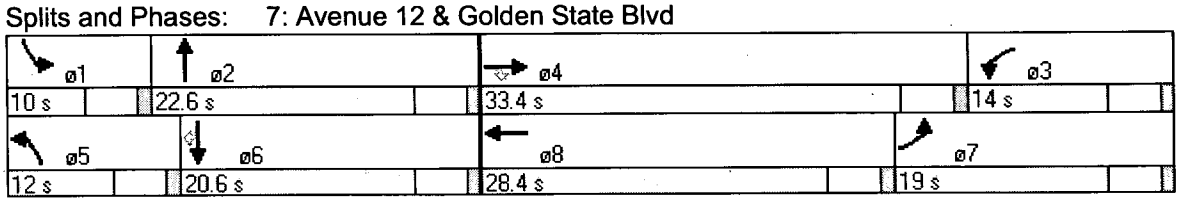
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.986			0.852				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		7			313				24
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	180	249	24	83	292	29	70	5	288	54	5	22
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	196	271	26	90	317	32	76	5	313	59	5	24
Lane Group Flow (vph)	196	271	26	90	349	0	76	318	0	59	5	24
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	19.0	33.4	33.4	14.0	28.4	0.0	12.0	22.6	0.0	10.0	20.6	20.6
Total Split (%)	23.8%	41.8%	41.8%	17.5%	35.5%	0.0%	15.0%	28.3%	0.0%	12.5%	25.8%	25.8%
Maximum Green (s)	14.4	28.8	28.8	9.4	23.8		7.4	18.0		5.4	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	13.6	43.2	43.2	9.0	36.5		7.7	11.9		6.2	8.3	8.3
Actuated g/C Ratio	0.17	0.54	0.54	0.11	0.46		0.10	0.15		0.08	0.10	0.10
v/c Ratio	0.70	0.29	0.03	0.47	0.43		0.49	0.66		0.44	0.03	0.13
Control Delay	45.1	14.3	6.0	36.2	14.6		45.6	11.4		46.4	29.8	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.1	14.3	6.0	36.2	14.6		45.6	11.4		46.4	29.8	13.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	B	A	D	B		D	B		D	C	B
Approach Delay		26.1			19.0			18.0			36.6	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	91	76	0	45	63		37	2		29	2	0
Queue Length 95th (ft)	#164	158	15	m65	216		79	70		#67	11	20
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	308	932	804	213	809		162	576		133	376	338
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.64	0.29	0.03	0.42	0.43		0.47	0.55		0.44	0.01	0.07

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 10 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 22.3 Intersection LOS: C
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.881		0.921			
Flt Protected	0.994					0.957
Satd. Flow (prot)	1499	0	1716	0	0	1783
Flt Permitted	0.994					0.957
Satd. Flow (perm)	1499	0	1716	0	0	1783
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	29	214	89	125	207	25
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	33	243	101	142	235	28
Lane Group Flow (vph)	276	0	243	0	0	263
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 50.0% ICU Level of Service A
Analysis Period (min) 15

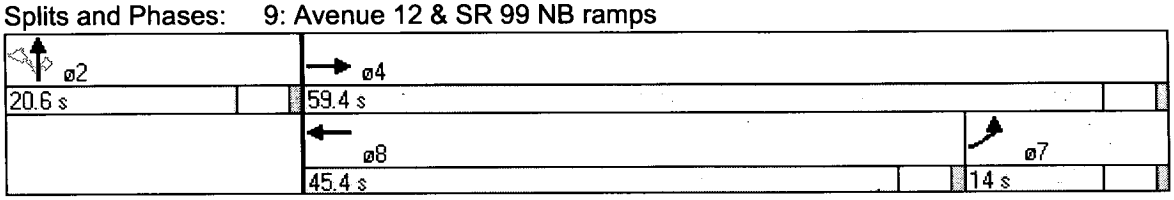
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.921				0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1683	0	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1683	0	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					132				89			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	104	487	0	0	249	354	155	4	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	118	553	0	0	283	402	176	5	89	0	0	0
Lane Group Flow (vph)	118	553	0	0	685	0	0	181	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	14.0	59.4	0.0	0.0	45.4	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	17.5%	74.3%	0.0%	0.0%	56.8%	0.0%	25.8%	25.8%	25.8%	0.0%	0.0%	0.0%
Maximum Green (s)	9.4	54.8			40.8		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	9.4	58.2			47.0			13.8	13.8			
Actuated g/C Ratio	0.12	0.73			0.59			0.17	0.17			
v/c Ratio	0.57	0.41			0.66			0.65	0.28			
Control Delay	39.9	3.4			14.2			41.6	8.9			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	39.9	3.4			14.2			41.6	8.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B			D	A			
Approach Delay		9.8			14.2			30.8				
Approach LOS		A			B			C				
Queue Length 50th (ft)	57	69			188			84	0			
Queue Length 95th (ft)	m100	80			323			141	34			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	219	1343			1044			336	370			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.54	0.41			0.66			0.54	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 15.1 Intersection LOS: B
Intersection Capacity Utilization 59.4% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



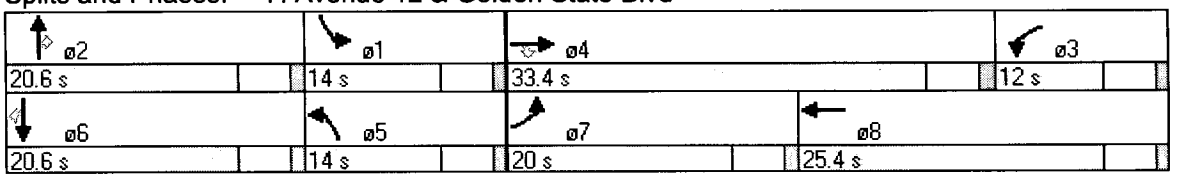
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		2				313			36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	276	417	14	101	343	10	149	9	288	160	9	33
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	300	453	15	110	373	11	162	10	313	174	10	36
Lane Group Flow (vph)	300	453	15	110	384	0	162	10	313	174	10	36
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Detector Phases	7	4	4	3	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	20.0	33.4	33.4	12.0	25.4	0.0	14.0	20.6	20.6	14.0	20.6	20.6
Total Split (%)	25.0%	41.8%	41.8%	15.0%	31.8%	0.0%	17.5%	25.8%	25.8%	17.5%	25.8%	25.8%
Maximum Green (s)	15.4	28.8	28.8	7.4	20.8		9.4	16.0	16.0	9.4	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	17.4	36.1	36.1	7.9	24.2		15.4	8.9	8.9	13.5	6.9	6.9
Actuated g/C Ratio	0.22	0.45	0.45	0.10	0.30		0.19	0.11	0.11	0.17	0.09	0.09
v/c Ratio	0.82	0.57	0.02	0.66	0.71		0.50	0.05	0.70	0.61	0.07	0.22
Control Delay	50.2	22.0	8.3	46.0	29.8		33.6	29.4	13.1	42.2	33.9	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.2	22.0	8.3	46.0	29.8		33.6	29.4	13.1	42.2	33.9	15.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	C		C	C	B	D	C	B
Approach Delay		32.8			33.4			20.3			37.4	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	137	171	0	56	182		72	5	0	78	5	0
Queue Length 95th (ft)	#289	294	12	m72	m#270		126	17	65	#183	19	26
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	371	801	689	170	542		326	369	561	284	369	342
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.57	0.02	0.65	0.71		0.50	0.03	0.56	0.61	0.03	0.11

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 29 (36%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 59.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876		0.930			
Flt Protected	0.996					0.958
Satd. Flow (prot)	1579	0	1732	0	0	1655
Flt Permitted	0.996					0.958
Satd. Flow (perm)	1579	0	1732	0	0	1655
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	56	625	143	152	243	35
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	64	710	163	173	276	40
Lane Group Flow (vph)	774	0	335	0	0	316
Sign Control	Free		Free			Stop

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 83.9% ICU Level of Service E
Analysis Period (min) 15

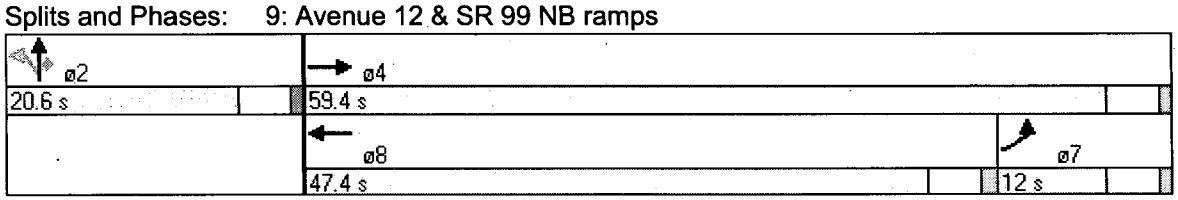
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.917				0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1659	0	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1659	0	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					159				149			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	114	751	0	0	280	452	174	1	131	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	130	853	0	0	318	514	198	1	149	0	0	0
Lane Group Flow (vph)	130	853	0	0	832	0	0	199	149	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	12.0	59.4	0.0	0.0	47.4	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	15.0%	74.3%	0.0%	0.0%	59.3%	0.0%	25.8%	25.8%	25.8%	0.0%	0.0%	0.0%
Maximum Green (s)	7.4	54.8			42.8		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	8.0	57.9			45.9			14.1	14.1			
Actuated g/C Ratio	0.10	0.72			0.57			0.18	0.18			
v/c Ratio	0.76	0.65			0.82			0.68	0.39			
Control Delay	52.7	4.1			20.0			42.7	8.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	52.7	4.1			20.0			42.7	8.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			C			D	A			
Approach Delay		10.5			20.0			27.9				
Approach LOS		B			C			C				
Queue Length 50th (ft)	66	44			260			93	0			
Queue Length 95th (ft)	m#132	107			#516			153	43			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	172	1310			1020			345	426			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.76	0.65			0.82			0.58	0.35			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 68.5% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casinon Alts A, B & C

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	169	0	21	160	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	8	8	0	14	16
Percent Heavy Vehicles	11	--	--	19	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	8	8	0	13	15
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	22	173	2	16	183	0
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	22		30			19	
C (m) (veh/h)	1349	1296		646			608	
v/c	0.01	0.02		0.05			0.03	
95% queue length	0.04	0.05		0.15			0.10	
Control Delay (s/veh)	7.7	7.8		10.8			11.1	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	10.8			11.1		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	236	2	32	253	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	11	5	0	10	38
Percent Heavy Vehicles	13	--	--	15	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	11	5	0	10	35
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	34	274	1	15	256	2
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	15	34		48			17	
C (m) (veh/h)	1227	1235		645			444	
v/c	0.01	0.03		0.07			0.04	
95% queue length	0.04	0.08		0.24			0.12	
Control Delay (s/veh)	8.0	8.0		11.0			13.4	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	11.0			13.4		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	143	107	21	107	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	47	9	118	19	6
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	44	9	109	18	6
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	22	116	0	5	155	116
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	22		143			56	
C (m) (veh/h)	1473	1292		512			539	
v/c	0.00	0.02		0.28			0.10	
95% queue length	0.01	0.05		1.13			0.35	
Control Delay (s/veh)	7.5	7.8		14.7			12.5	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	14.7			12.5		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	6	146	226	32	154	3
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	4	91	21	222	55	26
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	84	20	205	51	24
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	34	167	3	6	158	245
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	6	34		303			116	
C (m) (veh/h)	1407	1156		360			416	
v/c	0.00	0.03		0.84			0.28	
95% queue length	0.01	0.09		7.68			1.13	
Control Delay (s/veh)	7.6	8.2		50.5			17.0	
LOS	A	A		F			C	
Approach Delay (s/veh)	--	--	50.5			17.0		
Approach LOS	--	--	F			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	392	49	140	545	103
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	15	426	53	152	592	111
Percent Heavy Vehicles	2	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	61	3	104	67	9	11
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	66	3	113	72	9	11
Percent Heavy Vehicles	21	21	21	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	15	152	66		116		92	
C (m) (veh/h)	895	1073	73		496		74	
v/c	0.02	0.14	0.90		0.23		1.24	
95% queue length	0.05	0.49	4.56		0.90		7.11	
Control Delay (s/veh)	9.1	8.9	176.0		14.5		282.2	
LOS	A	A	F		B		F	
Approach Delay (s/veh)	--	--	73.0			282.2		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	23	875	84	212	819	218
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	24	951	91	230	890	236
Percent Heavy Vehicles	2	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	76	48	245	272	21	20
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	82	52	266	295	22	21
Percent Heavy Vehicles	4	4	4	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	24	230	82		318		338	
C (m) (veh/h)	620	641			0			
v/c	0.04	0.36						
95% queue length	0.12	1.63						
Control Delay (s/veh)	11.0	13.7						
LOS	B	B			F			
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 No Project AM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Ellis | North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	25	3	12	16	0	98
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	27	650	10	78	354	13
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	43		123		382	363	276	206
% Heavy Vehicles	8		8		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.6		0.1		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.3		0.9		0.0	0.0	0.0	0.1
Prop. Heavy Vehicle	0.1		0.1		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	0.0	0.2	-0.0

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.04		0.11		0.34	0.32	0.25	0.18
hd, final value (s)	6.79		6.10		5.75	5.69	6.17	5.97
x, final value	0.08		0.21		0.61	0.57	0.47	0.34
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	4.8		4.1		3.5	3.4	3.9	3.7

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	293		373		619	613	526	456
Delay (s/veh)	10.39		10.70		17.04	15.79	14.29	11.74
LOS	B		B		C	C	B	B
Approach: Delay (s/veh)	10.39		10.70		16.43		13.20	
LOS	B		B		C		B	
Intersection Delay (s/veh)	14.62							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 No Project PM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Ellis

North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	34	12	10	48	4	178
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	39	638	70	166	914	92
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	59		249		388	422	676	595
% Heavy Vehicles	2		2		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.6		0.2		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.2		0.8		0.0	0.2	0.0	0.2
Prop. Heavy Vehicle	0.0		0.0		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	-0.1	0.2	-0.1

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.05		0.22		0.34	0.38	0.60	0.53
hd, final value (s)	8.24		6.89		7.37	7.19	7.21	6.95
x, final value	0.13		0.48		0.79	0.84	1.35	1.15
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	6.2		4.9		5.1	4.9	4.9	4.7

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	309		499		488	501	676	595
Delay (s/veh)	12.52		16.00		32.93	37.56	193.06	112.00
LOS	B		C		D	E	F	F
Approach: Delay (s/veh)	12.52		16.00		35.34		155.11	
LOS	B		C		E		F	
Intersection Delay (s/veh)	96.48							
Intersection LOS	F							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	230	8	0	204	21
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	1	0	26	1	23
Percent Heavy Vehicles	8	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	1	0	24	1	22
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	221	22	0	249	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	0	0		50			1	
C (m) (veh/h)	1289	1263		569			480	
v/c	0.00	0.00		0.09			0.00	
95% queue length	0.00	0.00		0.29			0.01	
Control Delay (s/veh)	7.8	7.9		11.9			12.5	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	11.9			12.5		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	333	31	1	327	90
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	2	1	28	3	46
Percent Heavy Vehicles	17	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	2	1	26	3	43
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	355	97	1	361	33
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		77			3	
C (m) (veh/h)	1034	1127		453			305	
v/c	0.00	0.00		0.17			0.01	
95% queue length	0.00	0.00		0.61			0.03	
Control Delay (s/veh)	8.5	8.2		14.6			16.9	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	14.6			16.9		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 No Project AM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	11	125	29	10	115	42
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	114	15	27	74	40
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	177		179		158		152	
% Heavy Vehicles	5		11		20		15	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.1		0.1		0.1		0.2	
Prop. Right-Turns	0.2		0.3		0.1		0.3	
Prop. Heavy Vehicle	0.0		0.1		0.2		0.1	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		0.0		0.3		0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.16		0.16		0.14		0.14	
hd, final value (s)	5.01		5.06		5.37		5.21	
x, final value	0.25		0.25		0.24		0.22	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.0		3.1		3.4		3.2	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	427		429		408		402	
Delay (s/veh)	9.64		9.76		10.02		9.67	
LOS	A		A		B		A	
Approach: Delay (s/veh)	9.64		9.76		10.02		9.67	
LOS	A		A		B		A	
Intersection Delay (s/veh)	9.77							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 No Project PM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	32	95	46	19	160	90
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	197	20	72	207	46
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	186		290		290		351	
% Heavy Vehicles	8		4		6		16	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1		0.2		0.2	
Prop. Right-Turns	0.3		0.3		0.1		0.1	
Prop. Heavy Vehicle	0.1		0.0		0.1		0.2	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.0		-0.1		0.1		0.2	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.17		0.26		0.26		0.31	
hd, final value (s)	6.76		6.35		6.42		6.40	
x, final value	0.35		0.51		0.52		0.62	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	4.8		4.4		4.4		4.4	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	436		516		516		531	
Delay (s/veh)	13.34		15.82		16.07		19.46	
LOS	B		C		C		C	
Approach: Delay (s/veh)	13.34		15.82		16.07		19.46	
LOS	B		C		C		C	
Intersection Delay (s/veh)	16.62							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 @ Schnoor
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 16	North/South Street: Schnoor
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	34	8	81	4	18	27
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	280	23	41	224	46	10
Percent Heavy Vehicles	2	--	--	36	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	258	22	38	207	43	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	4	19	29	36	8	88
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	36	4	224		56		344	
C (m) (veh/h)	1559	1309	743		777		732	
v/c	0.02	0.00	0.30		0.07		0.47	
95% queue length	0.07	0.01	1.27		0.23		2.53	
Control Delay (s/veh)	7.4	7.8	11.9		10.0		14.2	
LOS	A	A	B		A		B	
Approach Delay (s/veh)	--	--	11.5			14.2		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 @ Schnoor
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 16	North/South Street: Schnoor
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	15	202	8	27	38
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	351	44	105	543	85	27
Percent Heavy Vehicles	13	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	323	41	97	500	79	25
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	8	29	41	68	16	219
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	68	8	543		112		500	
C (m) (veh/h)	1464	1332	529		697		542	
v/c	0.05	0.01	1.03		0.16		0.92	
95% queue length	0.15	0.02	15.17		0.57		11.32	
Control Delay (s/veh)	7.6	7.7	74.1		11.2		49.5	
LOS	A	A	F		B		E	
Approach Delay (s/veh)	--	--	63.4			49.5		
Approach LOS	--	--	F			E		

Copyright © 2005 University of Florida, All Rights Reserved

2008 No Project AM
21: Avenue 16 & SR 99 SB ramps 7/25/2006

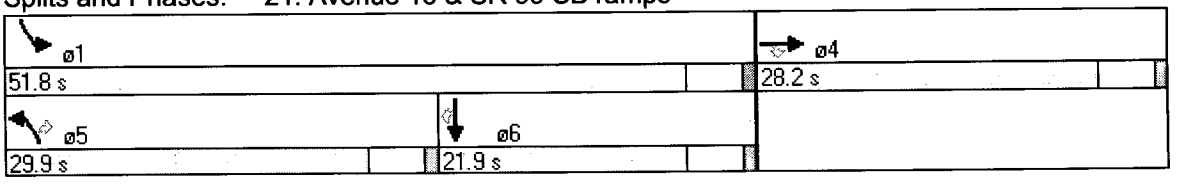
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			403						7	2		208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	130	371	0	0	0	239	0	6	2	98	191
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
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	14%	14%	14%	6%	6%	6%
Adj. Flow (vph)	0	141	403	0	0	0	260	0	7	2	107	208
Lane Group Flow (vph)	0	141	403	0	0	0	260	0	7	2	107	208
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	28.2	28.2	0.0	0.0	0.0	29.9	0.0	29.9	51.8	21.9	21.9
Total Split (%)	0.0%	35.3%	35.3%	0.0%	0.0%	0.0%	37.4%	0.0%	37.4%	64.8%	27.4%	27.4%
Maximum Green (s)		23.3	23.3				25.0		25.0	46.9	17.0	17.0
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		24.2	24.2				25.9		25.9	15.6	17.9	17.9
Actuated g/C Ratio		0.30	0.30				0.32		0.32	0.18	0.22	0.22
v/c Ratio		0.25	0.53				0.51		0.02	0.01	0.27	0.41
Control Delay		22.6	5.4				26.1		11.2	12.0	27.8	6.9
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		22.6	5.4				26.1		11.2	12.0	27.8	6.9
LOS		C	A				C		B	B	C	A
Approach Delay		9.8									14.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A									B	
Queue Length 50th (ft)		53	0				104		0	0	44	0
Queue Length 95th (ft)		98	62				175		9	3	87	52
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		558	755				512		463	699	401	502
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.25	0.53				0.51		0.02	0.00	0.27	0.41

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 14.8 Intersection LOS: B
Intersection Capacity Utilization 34.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



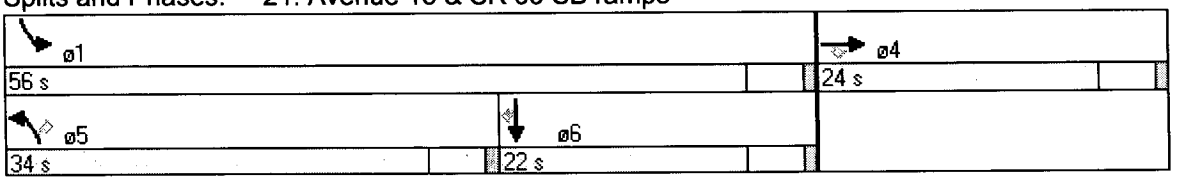
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			720						11	3		488
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	285	662	0	0	0	524	0	10	3	171	449
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	310	720	0	0	0	570	0	11	3	186	488
Lane Group Flow (vph)	0	310	720	0	0	0	570	0	11	3	186	488
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	24.0	24.0	0.0	0.0	0.0	34.0	0.0	34.0	56.0	22.0	22.0
Total Split (%)	0.0%	30.0%	30.0%	0.0%	0.0%	0.0%	42.5%	0.0%	42.5%	70.0%	27.5%	27.5%
Maximum Green (s)		19.1	19.1				29.1		29.1	51.1	17.1	17.1
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		20.0	20.0				30.0		30.0	16.5	18.0	18.0
Actuated g/C Ratio		0.25	0.25				0.38		0.38	0.19	0.22	0.22
v/c Ratio		0.67	0.77				0.86		0.02	0.01	0.45	0.67
Control Delay		35.0	8.8				38.2		8.8	10.3	30.9	8.0
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		35.0	8.8				38.2		8.8	10.3	30.9	8.0
LOS		D	A				D		A	B	C	A
Approach Delay		16.7									14.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B									B	
Queue Length 50th (ft)		139	0				257		0	0	81	0
Queue Length 95th (ft)		225	101				#442		10	3	141	80
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		466	936				664		601	759	411	728
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.67	0.77				0.86		0.02	0.00	0.45	0.67

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 21.3 Intersection LOS: C
Intersection Capacity Utilization 63.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/17/06
Analysis Time Period	2008 No Project AM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		130			6	133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	293	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	270					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	6	144	0	141	0
Percent Heavy Vehicles	3	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						293		
C (m) (veh/h)						767		
v/c						0.38		
95% queue length						1.80		
Control Delay (s/veh)						12.6		
LOS						B		
Approach Delay (s/veh)	--	--				12.6		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/17/06
Analysis Time Period	2008 No Project PM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		194			10	299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	468	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	431					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	10	324	0	210	0
Percent Heavy Vehicles	2	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						468		
C (m) (veh/h)						620		
v/c						0.75		
95% queue length						6.80		
Control Delay (s/veh)						26.5		
LOS						D		
Approach Delay (s/veh)	--	--				26.5		
Approach LOS	--	--				D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	
Analysis Time Period	2008 No Project AM		

Project Description	04-837.1 Northfork Casino Alts A, B & C
East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		112		270	199	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	144
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	293	216	0	0	121	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		293			144			
C (m) (veh/h)		1430			930			
v/c		0.20			0.15			
95% queue length		0.77			0.55			
Control Delay (s/veh)		8.2			9.6			
LOS		A			A			
Approach Delay (s/veh)	--	--	9.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235		431	402	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	324
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	468	436	0	0	255	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		468			324			
C (m) (veh/h)		1265			784			
v/c		0.37			0.41			
95% queue length		1.73			2.04			
Control Delay (s/veh)		9.5			12.8			
LOS		A			B			
Approach Delay (s/veh)	--	--	12.8					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	*TPG Consulting, Inc.*
Date Performed	*7/17/06*
Analysis Time Period	*2008 No Project AM*

Site Information

Intersection	*Gateway/Ave 16 at SR 99 NB*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description *04-837.1 Northfork Casino Alts A, B & C*

East/West Street: *SR 99 NB ramps* | North/South Street: *Gateway/Avenue 16*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*112*	*130*		*199*	
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*6*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*6*		
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*216*	*0*	*0*	*121*	*141*
Percent Heavy Vehicles	*0*	*0*	*0*	*2*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*0*
Configuration				*L*		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*					
v (veh/h)			*6*					
C (m) (veh/h)			*599*					
v/c			*0.01*					
95% queue length			*0.03*					
Control Delay (s/veh)			*11.1*					
LOS			*B*					
Approach Delay (s/veh)	--	--	*11.1*					
Approach LOS	--	--	*B*					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/17/06
Analysis Time Period	2008 No Project PM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alts A, B & C

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235	194		402	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	436	0	0	255	210
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			10					
C (m) (veh/h)			356					
v/c			0.03					
95% queue length			0.09					
Control Delay (s/veh)			15.4					
LOS			C					
Approach Delay (s/veh)	--	--	15.4					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

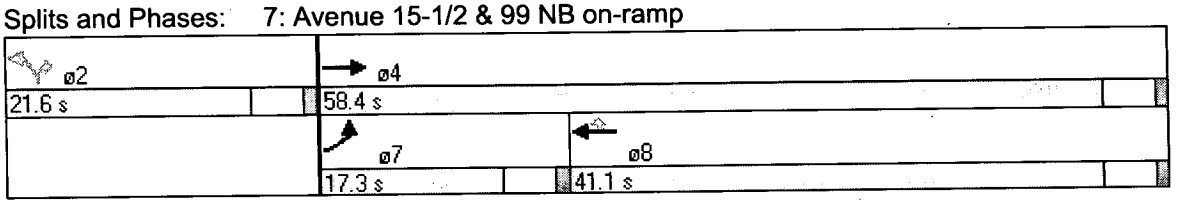
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						165			200			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	117	692	0	0	1025	152	344	0	184	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	127	752	0	0	1114	165	374	0	200	0	0	0
Lane Group Flow (vph)	127	752	0	0	1114	165	374	0	200	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	17.3	58.4	0.0	0.0	41.1	41.1	21.6	0.0	21.6	0.0	0.0	0.0
Total Split (%)	21.6%	73.0%	0.0%	0.0%	51.4%	51.4%	27.0%	0.0%	27.0%	0.0%	0.0%	0.0%
Maximum Green (s)	12.7	53.8			36.5	36.5	17.0		17.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	11.2	57.3			44.4	44.4	14.7		14.7			
Actuated g/C Ratio	0.14	0.72			0.56	0.56	0.18		0.18			
v/c Ratio	0.51	0.30			0.58	0.18	0.63		0.46			
Control Delay	51.6	0.3			15.1	2.7	34.7		8.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	51.6	0.3			15.1	2.7	34.7		8.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B	A	C		A			
Approach Delay		7.7			13.5							
Approach LOS		A			B							
Queue Length 50th (ft)	71	0			194	0	89		0			
Queue Length 95th (ft)	m114	1			292	31	127		51			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	295	2535			1926	935	713		485			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.43	0.30			0.58	0.18	0.52		0.41			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 14.2 Intersection LOS: B
Intersection Capacity Utilization 60.3% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						298			27			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	229	1736	0	0	1679	295	699	0	311	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	249	1887	0	0	1825	321	760	0	338	0	0	0
Lane Group Flow (vph)	249	1887	0	0	1825	321	760	0	338	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	16.4	66.0	0.0	0.0	49.6	49.6	24.0	0.0	24.0	0.0	0.0	0.0
Total Split (%)	18.2%	73.3%	0.0%	0.0%	55.1%	55.1%	26.7%	0.0%	26.7%	0.0%	0.0%	0.0%
Maximum Green (s)	11.8	61.4			45.0	45.0	19.4		19.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	12.4	62.0			45.6	45.6	20.0		20.0			
Actuated g/C Ratio	0.14	0.69			0.51	0.51	0.22		0.22			
v/c Ratio	1.02	0.77			1.02	0.34	1.01		0.92			
Control Delay	73.2	1.4			49.2	3.0	70.4		63.2			
Queue Delay	0.0	1.3			0.0	0.0	0.0		0.0			
Total Delay	73.2	2.7			49.2	3.0	70.4		63.2			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			D	A	E		E			
Approach Delay		10.9			42.3							
Approach LOS		B			D							
Queue Length 50th (ft)	~156	33			~549	6	~226		175			
Queue Length 95th (ft)	m#146	m32			#720	47	#347		#338			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	244	2438			1793	949	756		369			
Starvation Cap Reductn	0	323			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.02	0.89			1.02	0.34	1.01		0.92			

Intersection Summary

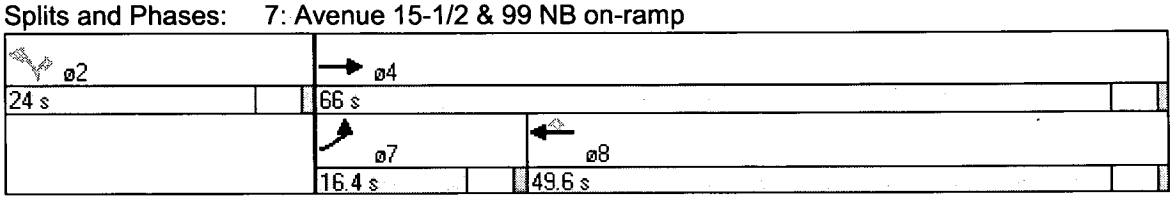
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 35.1 Intersection LOS: D
Intersection Capacity Utilization 130.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



2008 No Project AM
5: Avenue 15-1/2 & 99 SB off-ramp 7/25/2006

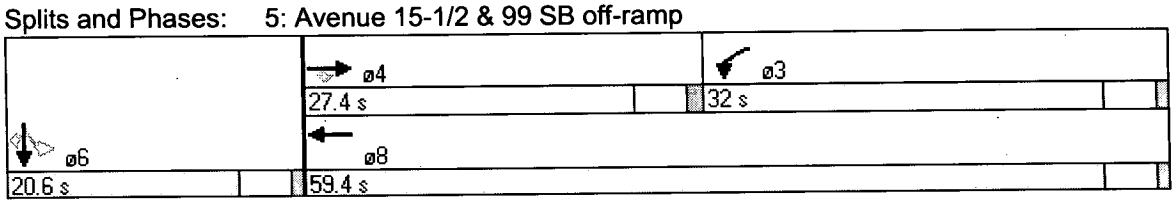
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			385									87
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	664	354	361	1008	0	0	0	0	150	1	80
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	722	385	392	1096	0	0	0	0	163	1	87
Lane Group Flow (vph)	0	722	385	392	1096	0	0	0	0	0	164	87
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	27.4	27.4	32.0	59.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	34.3%	34.3%	40.0%	74.3%	0.0%	0.0%	0.0%	0.0%	25.8%	25.8%	25.8%
Maximum Green (s)		22.8	22.8	27.4	54.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		27.3	27.3	28.0	59.3						12.7	12.7
Actuated g/C Ratio		0.34	0.34	0.35	0.74						0.16	0.16
v/c Ratio		0.60	0.49	0.64	0.43						0.58	0.27
Control Delay		25.1	4.9	20.9	1.2						39.1	9.0
Queue Delay		0.0	0.0	0.1	0.1						0.0	0.0
Total Delay		25.1	4.9	21.0	1.3						39.1	9.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A						D	A
Approach Delay		18.0			6.5						28.6	
Approach LOS		B			A						C	
Queue Length 50th (ft)		155	0	155	2						77	0
Queue Length 95th (ft)		228	61	234	6						130	35
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1207	793	608	2572						368	397
Starvation Cap Reductn		0	0	11	522						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.60	0.49	0.66	0.53						0.45	0.22

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 6 (8%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 60.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



2008 No Project PM
5: Avenue 15-1/2 & 99 SB off-ramp

7/25/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.952	
Satd. Flow (prot)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Flt Permitted				0.950							0.952	
Satd. Flow (perm)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			579									13
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1588	575	296	2082	0	0	0	0	363	1	191
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1726	625	322	2263	0	0	0	0	395	1	208
Lane Group Flow (vph)	0	1726	625	322	2263	0	0	0	0	0	396	208
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	46.9	46.9	20.0	66.9	0.0	0.0	0.0	0.0	23.1	23.1	23.1
Total Split (%)	0.0%	52.1%	52.1%	22.2%	74.3%	0.0%	0.0%	0.0%	0.0%	25.7%	25.7%	25.7%
Maximum Green (s)		42.3	42.3	15.4	62.3					18.5	18.5	18.5
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		42.9	42.9	16.0	62.9						19.1	19.1
Actuated g/C Ratio		0.48	0.48	0.18	0.70						0.21	0.21
v/c Ratio		1.02	0.59	1.02	0.92						1.05	0.60
Control Delay		52.7	4.5	55.0	8.3						97.5	38.2
Queue Delay		0.0	0.0	0.0	5.9						0.0	0.0
Total Delay		52.7	4.5	55.0	14.2						97.5	38.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A	E	B						F	D
Approach Delay		39.9			19.3						77.1	
Approach LOS		D			B						E	
Queue Length 50th (ft)		~555	14	~184	226						~248	101
Queue Length 95th (ft)		#691	77	m#176	m223						#424	174
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1687	1058	315	2473						376	346
Starvation Cap Reductn		0	0	0	185						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		1.02	0.59	1.02	0.99						1.05	0.60

Intersection Summary

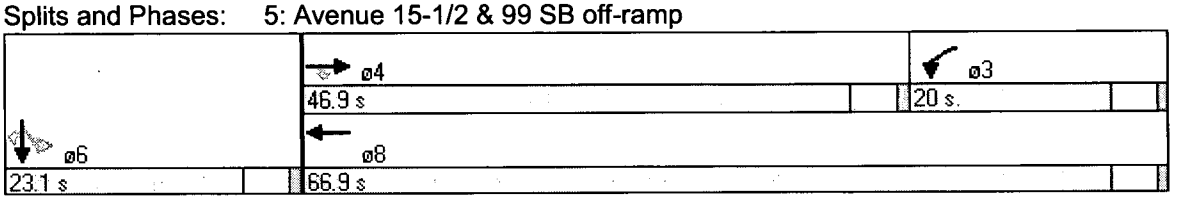
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 80 (89%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 34.3 Intersection LOS: C
Intersection Capacity Utilization 130.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



2008 No Project AM
6: 99 NB on-ramp & SR 145 / Madera Ave 7/25/2006

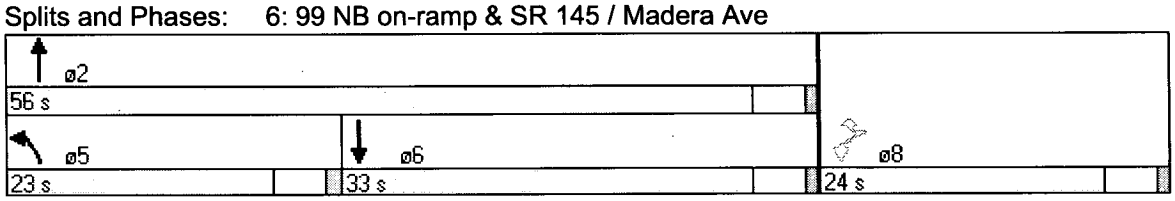
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.902	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46					188	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	377	0	42	357	500	0	0	165	439
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	410	0	46	388	543	0	0	179	477
Lane Group Flow (vph)	0	0	0	410	0	46	388	543	0	0	656	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	24.0	0.0	24.0	23.0	56.0	0.0	0.0	33.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	30.0%	0.0%	30.0%	28.8%	70.0%	0.0%	0.0%	41.3%	0.0%
Maximum Green (s)				19.4		19.4	18.4	51.4			28.4	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				20.1		20.1	19.0	51.9			29.0	
Actuated g/C Ratio				0.25		0.25	0.24	0.65			0.36	
v/c Ratio				0.92		0.11	0.92	0.45			0.90	
Control Delay				58.8		8.4	55.6	9.9			35.2	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				58.8		8.4	55.6	9.9			35.2	
LOS				E		A	E	A			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								28.9			35.2	
Approach LOS								C			D	
Queue Length 50th (ft)				200		0	203	186			228	
Queue Length 95th (ft)				#368		25	m#362	252			#444	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				446		433	420	1213			731	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.92		0.11	0.92	0.45			0.90	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 8 (10%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 36.5 Intersection LOS: D
Intersection Capacity Utilization 86.3% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave



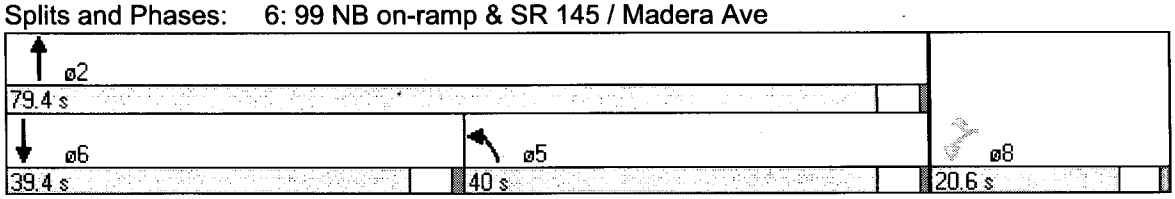
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.902	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41					149	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	250	0	38	569	682	0	0	165	439
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	272	0	41	618	741	0	0	179	477
Lane Group Flow (vph)	0	0	0	272	0	41	618	741	0	0	656	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	40.0	79.4	0.0	0.0	39.4	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.6%	0.0%	20.6%	40.0%	79.4%	0.0%	0.0%	39.4%	0.0%
Maximum Green (s)				16.0		16.0	35.4	74.8			34.8	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				16.7		16.7	36.1	75.3			35.2	
Actuated g/C Ratio				0.17		0.17	0.36	0.75			0.35	
v/c Ratio				0.92		0.14	0.97	0.53			0.95	
Control Delay				77.7		12.5	47.8	7.5			50.2	
Queue Delay				0.0		0.0	0.0	1.3			0.0	
Total Delay				77.7		12.5	47.8	8.9			50.2	
LOS				E		B	D	A			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								26.6			50.2	
Approach LOS								C			D	
Queue Length 50th (ft)				173		0	349	215			328	
Queue Length 95th (ft)				#327		30	m#461	m246			#567	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				296		299	638	1405			691	
Starvation Cap Reductn				0		0	0	433			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.92		0.14	0.97	0.76			0.95	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 75 (75%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 39.0 Intersection LOS: D
Intersection Capacity Utilization 91.1% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave



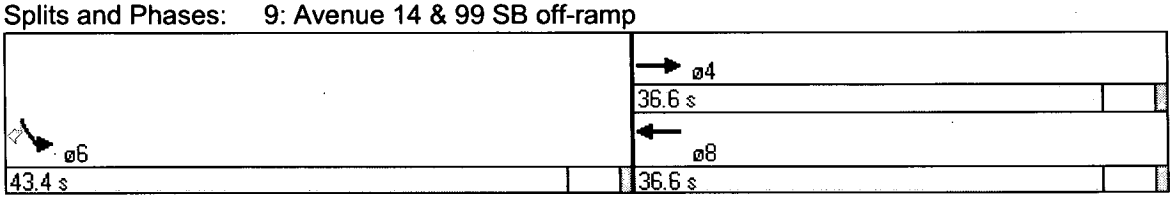
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						256
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	431	417	0	482	297
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	468	453	0	524	323
Lane Group Flow (vph)	0	468	453	0	524	323
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	36.6	36.6	0.0	43.4	43.4
Total Split (%)	0.0%	45.8%	45.8%	0.0%	54.3%	54.3%
Maximum Green (s)		32.0	32.0		38.8	38.8
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		42.9	42.9		29.1	29.1
Actuated g/C Ratio		0.54	0.54		0.36	0.36
v/c Ratio		0.25	0.45		0.82	0.44
Control Delay		11.9	4.1		33.4	5.6
Queue Delay		0.1	0.5		0.3	0.0
Total Delay		12.0	4.6		33.7	5.6
LOS		B	A		C	A
Approach Delay		12.0	4.6		23.0	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		C	
Queue Length 50th (ft)		62	13		232	22
Queue Length 95th (ft)		117	56		280	59
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1896	998		863	902
Starvation Cap Reductn		0	215		0	0
Spillback Cap Reductn		579	0		62	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.36	0.58		0.65	0.36

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 15.4 Intersection LOS: B
Intersection Capacity Utilization 55.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp



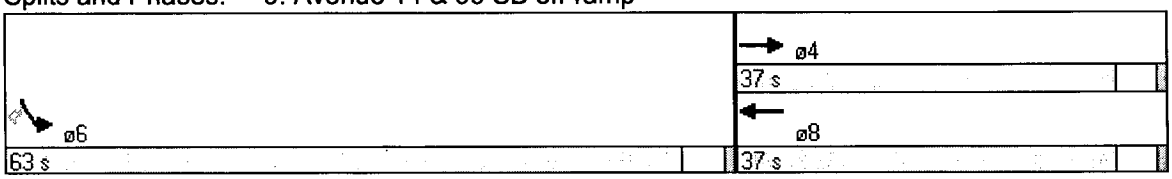
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						192
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	558	314	0	630	177
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	607	341	0	685	192
Lane Group Flow (vph)	0	607	341	0	685	192
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	37.0	37.0	0.0	63.0	63.0
Total Split (%)	0.0%	37.0%	37.0%	0.0%	63.0%	63.0%
Maximum Green (s)		32.4	32.4		58.4	58.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		49.0	49.0		43.0	43.0
Actuated g/C Ratio		0.49	0.49		0.43	0.43
v/c Ratio		0.35	0.37		0.90	0.24
Control Delay		18.5	12.4		41.1	2.5
Queue Delay		0.0	6.1		10.7	0.0
Total Delay		18.5	18.4		51.8	2.5
LOS		B	B		D	A
Approach Delay		18.5	18.4		41.0	
Approach LOS		B	B		D	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		121	94		394	0
Queue Length 95th (ft)		209	189		423	29
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1733	912		1044	1013
Starvation Cap Reductn		0	506		0	0
Spillback Cap Reductn		56	0		333	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.36	0.84		0.96	0.19

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 29.3 Intersection LOS: C
Intersection Capacity Utilization 58.1% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp



2008 No Project AM
1: Avenue 14 & SR 145 / Madera Ave 7/25/2006

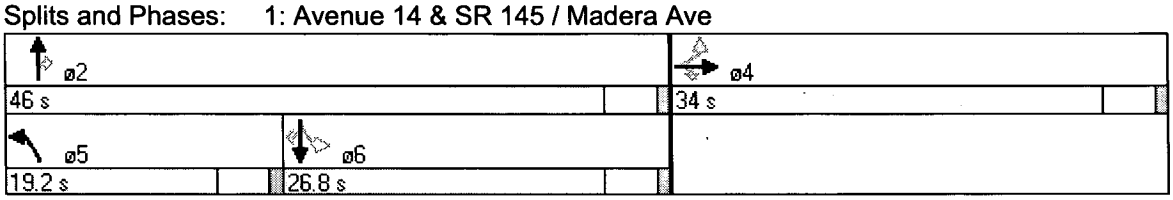
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.966					0.950				0.998	
Satd. Flow (prot)	0	1748	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted		0.966					0.950				0.926	
Satd. Flow (perm)	0	1748	1538	0	0	0	1752	1845	1568	0	3245	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			580						21			285
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	265	114	534	0	0	0	155	593	19	11	269	262
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	288	124	580	0	0	0	168	645	21	12	292	285
Lane Group Flow (vph)	0	412	580	0	0	0	168	645	21	0	304	285
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	34.0	34.0	34.0	0.0	0.0	0.0	19.2	46.0	46.0	26.8	26.8	26.8
Total Split (%)	42.5%	42.5%	42.5%	0.0%	0.0%	0.0%	24.0%	57.5%	57.5%	33.5%	33.5%	33.5%
Maximum Green (s)	29.4	29.4	29.4				14.6	41.4	41.4	22.2	22.2	22.2
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		26.4	26.4				12.7	45.6	45.6		28.8	28.8
Actuated g/C Ratio		0.33	0.33				0.16	0.57	0.57		0.36	0.36
v/c Ratio		0.71	0.65				0.60	0.61	0.02		0.26	0.38
Control Delay		28.8	7.5				40.2	16.0	4.3		8.4	1.8
Queue Delay		65.1	1.5				0.5	0.0	0.0		0.0	0.0
Total Delay		93.9	9.0				40.7	16.0	4.3		8.4	1.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				D	B	A		A	A
Approach Delay		44.3						20.7			5.2	
Approach LOS		D						C			A	
Queue Length 50th (ft)		121	0				78	220	0		24	0
Queue Length 95th (ft)		m225	m106				136	338	10		m45	m11
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		667	945				334	1063	912		1192	756
Starvation Cap Reductn		300	197				0	0	0		0	0
Spillback Cap Reductn		0	0				29	0	0		0	4
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.12	0.78				0.55	0.61	0.02		0.26	0.38

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 56 (70%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 26.6 Intersection LOS: C
Intersection Capacity Utilization 69.6% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave



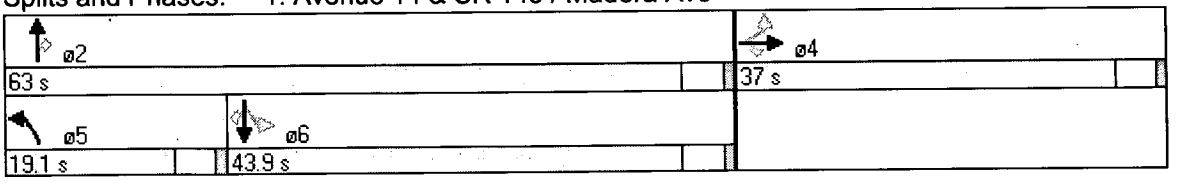
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.970					0.950				0.997	
Satd. Flow (prot)	0	1772	1553	0	0	0	1770	1863	1583	0	3529	1583
Flt Permitted		0.970					0.950				0.758	
Satd. Flow (perm)	0	1772	1553	0	0	0	1770	1863	1583	0	2683	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			579						16			208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	314	187	687	0	0	0	123	937	16	19	293	191
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	341	203	747	0	0	0	134	1018	17	21	318	208
Lane Group Flow (vph)	0	544	747	0	0	0	134	1018	17	0	339	208
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	37.0	37.0	37.0	0.0	0.0	0.0	19.1	63.0	63.0	43.9	43.9	43.9
Total Split (%)	37.0%	37.0%	37.0%	0.0%	0.0%	0.0%	19.1%	63.0%	63.0%	43.9%	43.9%	43.9%
Maximum Green (s)	32.4	32.4	32.4				14.5	58.4	58.4	39.3	39.3	39.3
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		32.9	32.9				12.6	59.1	59.1		42.5	42.5
Actuated g/C Ratio		0.33	0.33				0.13	0.59	0.59		0.42	0.42
v/c Ratio		0.93	0.83				0.60	0.92	0.02		0.30	0.26
Control Delay		48.7	16.1				52.3	34.1	4.1		15.9	1.9
Queue Delay		168.1	2.8				0.0	0.0	0.0		0.0	0.1
Total Delay		216.8	18.8				52.3	34.1	4.1		15.9	2.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	B				D	C	A		B	A
Approach Delay		102.3						35.7			10.6	
Approach LOS		F						D			B	
Queue Length 50th (ft)		361	127				81	546	0		49	1
Queue Length 95th (ft)		m#457	m176				140	#868	9		m58	m5
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		595	905				267	1111	951		1141	792
Starvation Cap Reductn		201	79				0	0	0		0	0
Spillback Cap Reductn		0	0				0	0	0		0	140
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.38	0.90				0.50	0.92	0.02		0.30	0.32

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 38 (38%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 59.7 Intersection LOS: E
Intersection Capacity Utilization 95.2% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2 | North/South Street: Pistachio Drive

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	162			145	239
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	37	184	0	0	164	271
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				201		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	228	0	25
Percent Heavy Vehicles	0	0	0	25	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	37						253	
C (m) (veh/h)	961						453	
v/c	0.04						0.56	
95% queue length	0.12						3.35	
Control Delay (s/veh)	8.9						22.5	
LOS	A						C	
Approach Delay (s/veh)	–	–				22.5		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/8/2006 8:37 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	13	218			198	261
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	14	247	0	0	225	296
Percent Heavy Vehicles	34	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				212		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	240	0	25
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	14						265	
C (m) (veh/h)	901						434	
v/c	0.02						0.61	
95% queue length	0.05						3.96	
Control Delay (s/veh)	9.1						25.5	
LOS	A						D	
Approach Delay (s/veh)	--	--				25.5		
Approach LOS	--	--				D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/8/2006 8:38 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	56			65	96
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	2	63	0	0	73	109
Percent Heavy Vehicles	8	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				98		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	111	0	2
Percent Heavy Vehicles	0	0	0	79	0	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	2						113	
C (m) (veh/h)	1358						702	
v/c	0.00						0.16	
95% queue length	0.00						0.57	
Control Delay (s/veh)	7.7						11.1	
LOS	A						B	
Approach Delay (s/veh)	–	–				11.1		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/8/2006 8:38 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	112			128	99
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	127	0	0	145	112
Percent Heavy Vehicles	5	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				107		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	121	0	2
Percent Heavy Vehicles	0	0	0	48	0	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	5						123	
C (m) (veh/h)	1290						621	
v/c	0.00						0.20	
95% queue length	0.01						0.73	
Control Delay (s/veh)	7.8						12.2	
LOS	A						B	
Approach Delay (s/veh)	–	–				12.2		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/8/2006 8:36 AM

ATTACHMENT VI – C - 7

OPENING DAY (2008) NO PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR-99 SB OFF RAMP/ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

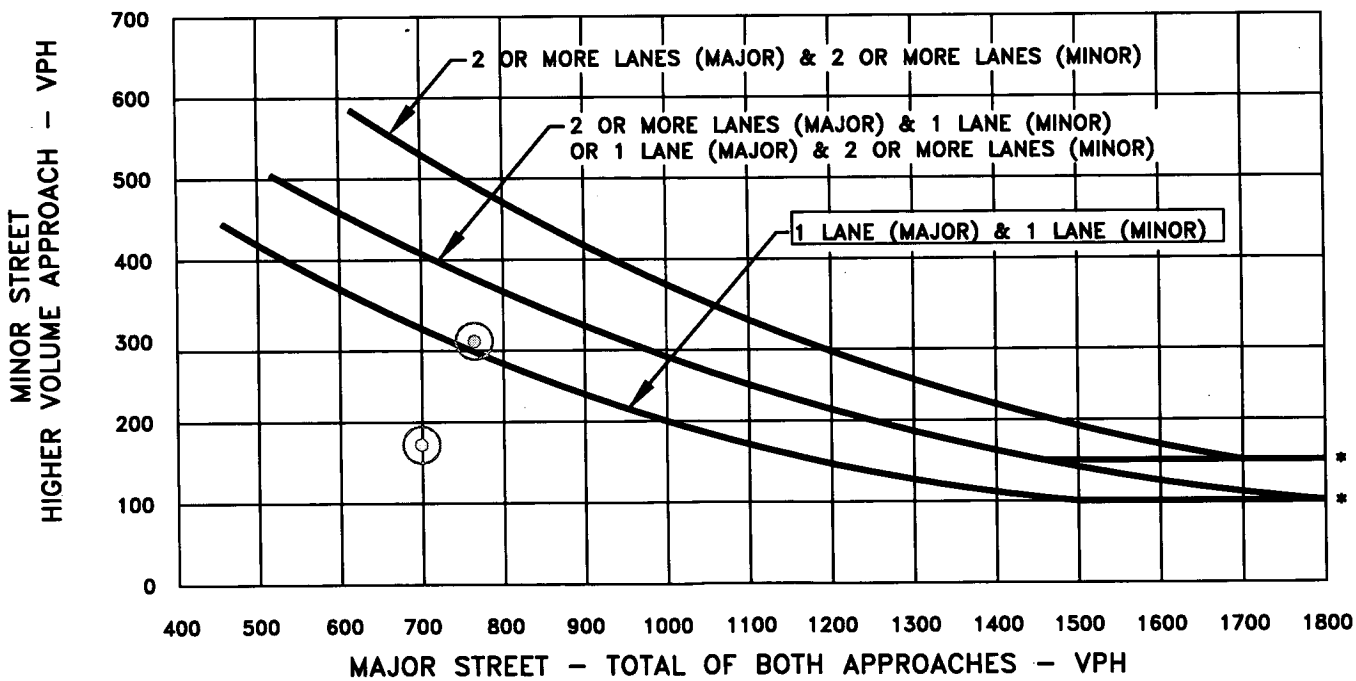
CONDITION: 2008 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		699	764			
Highest Approaches – Minor Street	✓		172	300			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR-99 NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

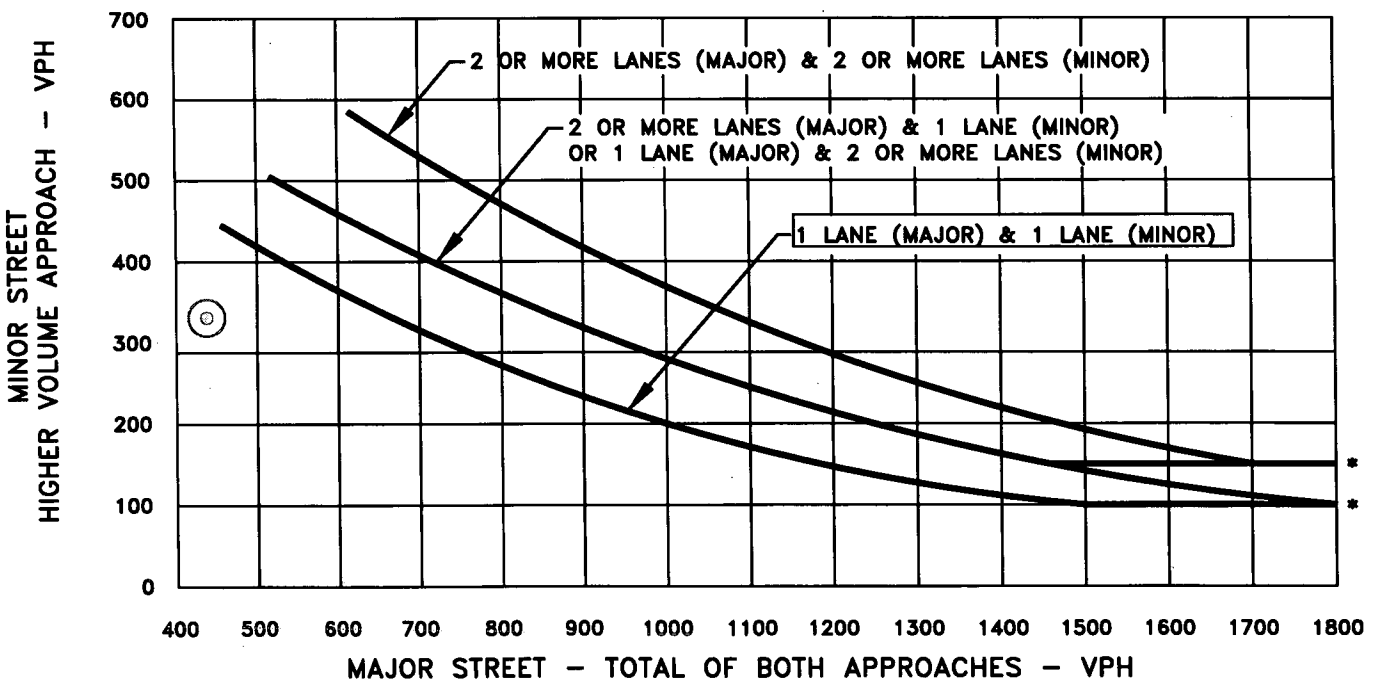
CONDITION: 2008 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		345	438			
Highest Approaches – Minor Street	✓		264	331			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: Avenue 17 Critical Approach Speed 45 mph

MINOR STREET: SR-99 SB OFF RAMP Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ]

[ ] URBAN (U)

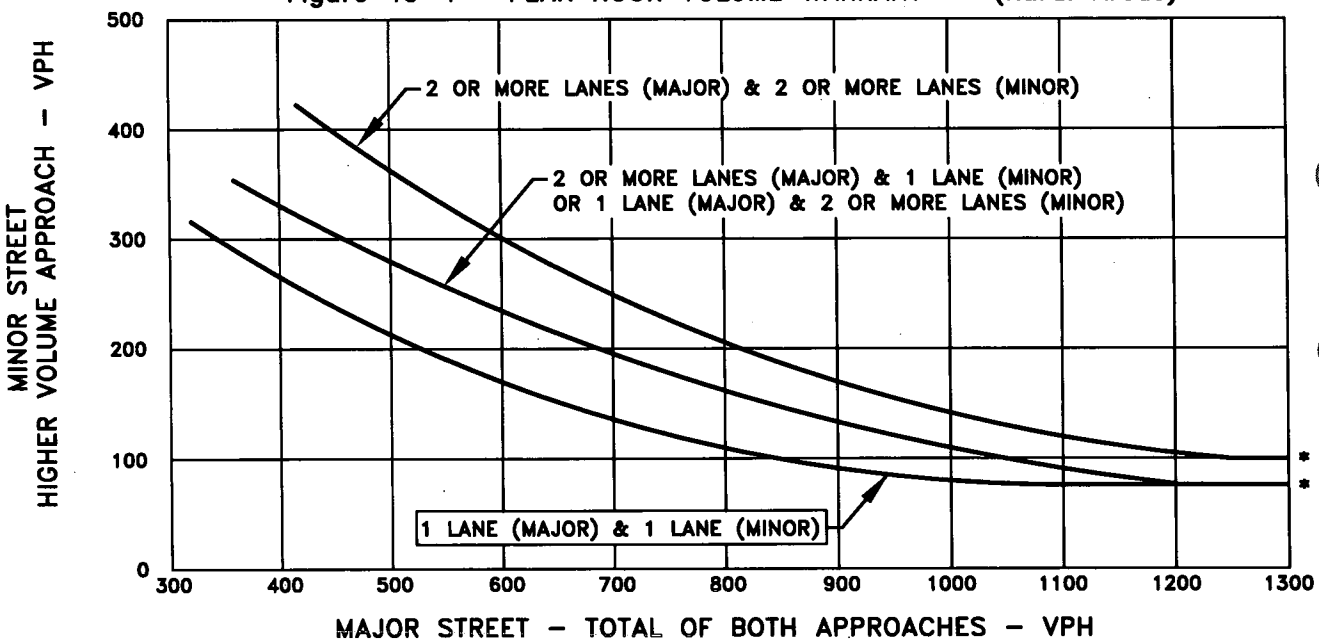
CONDITION: 2008 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		1442	3160				
Highest Approaches – Minor Street	✓		197	356				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: GOLDEN STATE BOULEVARD Critical Approach Speed 35 mph

MINOR STREET: SR-99 SB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

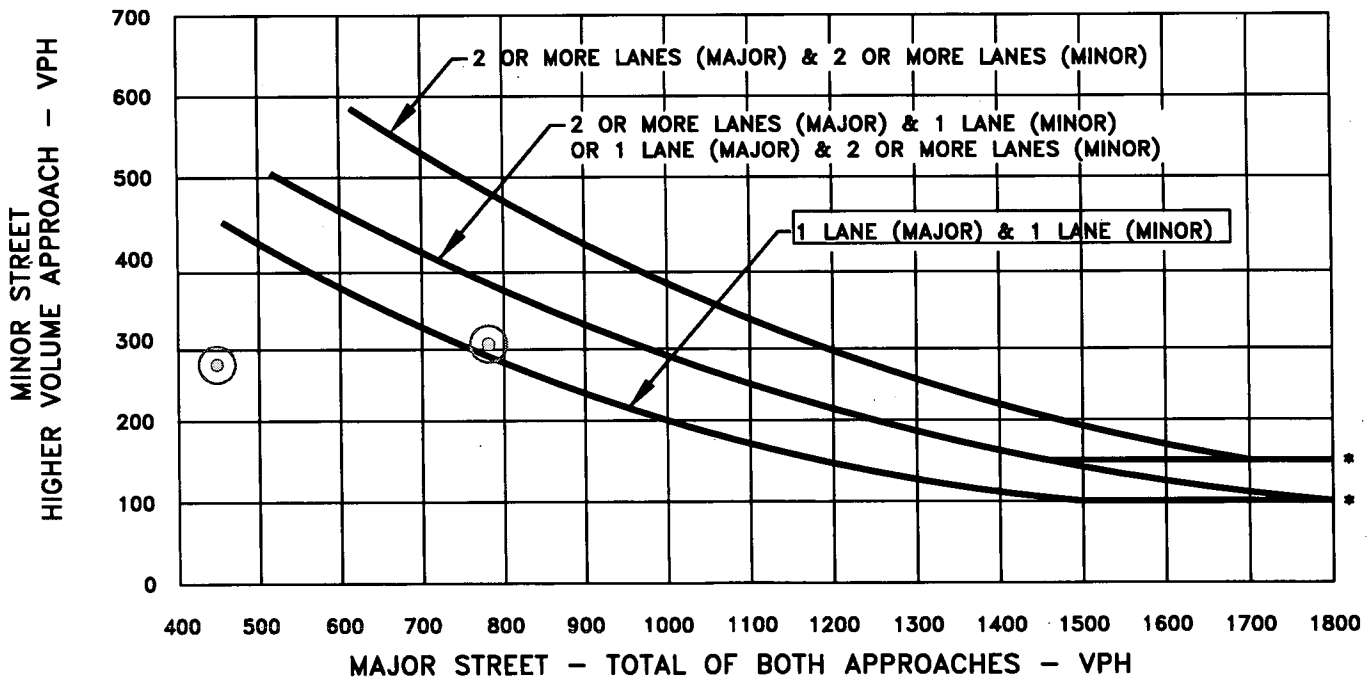
CONDITION: 208 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		448	781			
Highest Approaches – Minor Street	✓		270	295			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

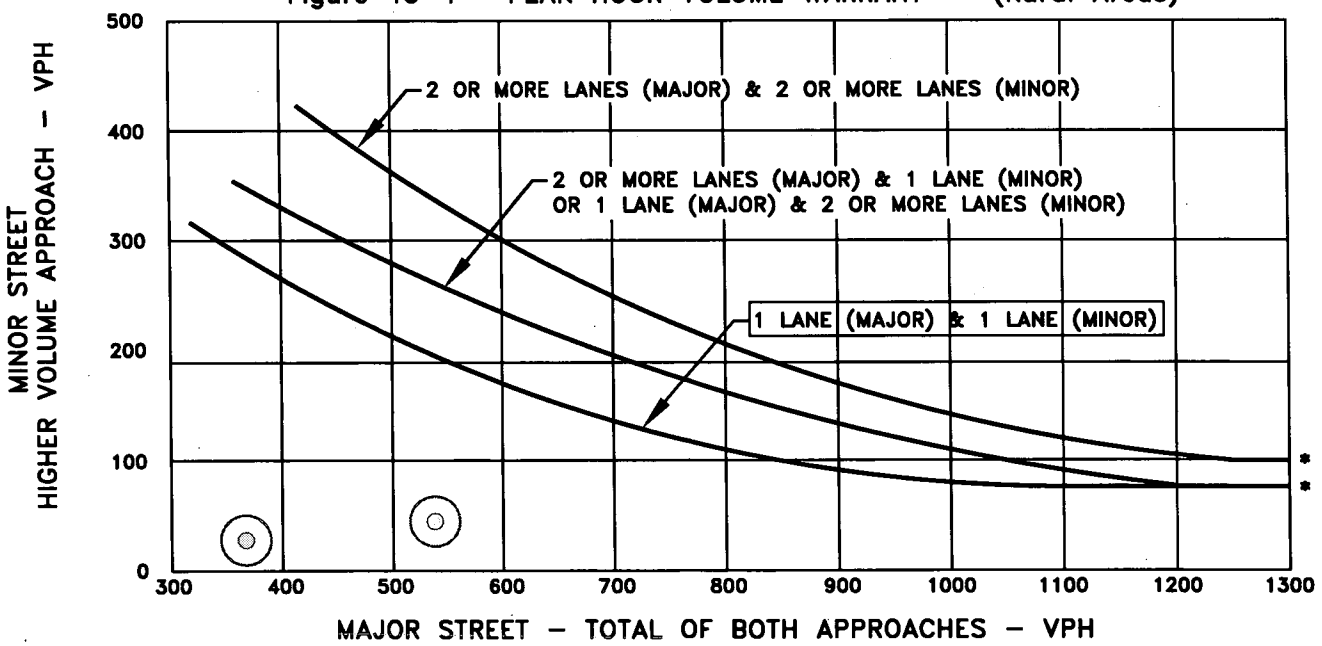
CONDITION: 2008 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		367	538				
Highest Approaches – Minor Street	✓		28	45				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 17 Critical Approach Speed 45 mph

MINOR STREET: ROAD 23 Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ]

[ ] URBAN (U)

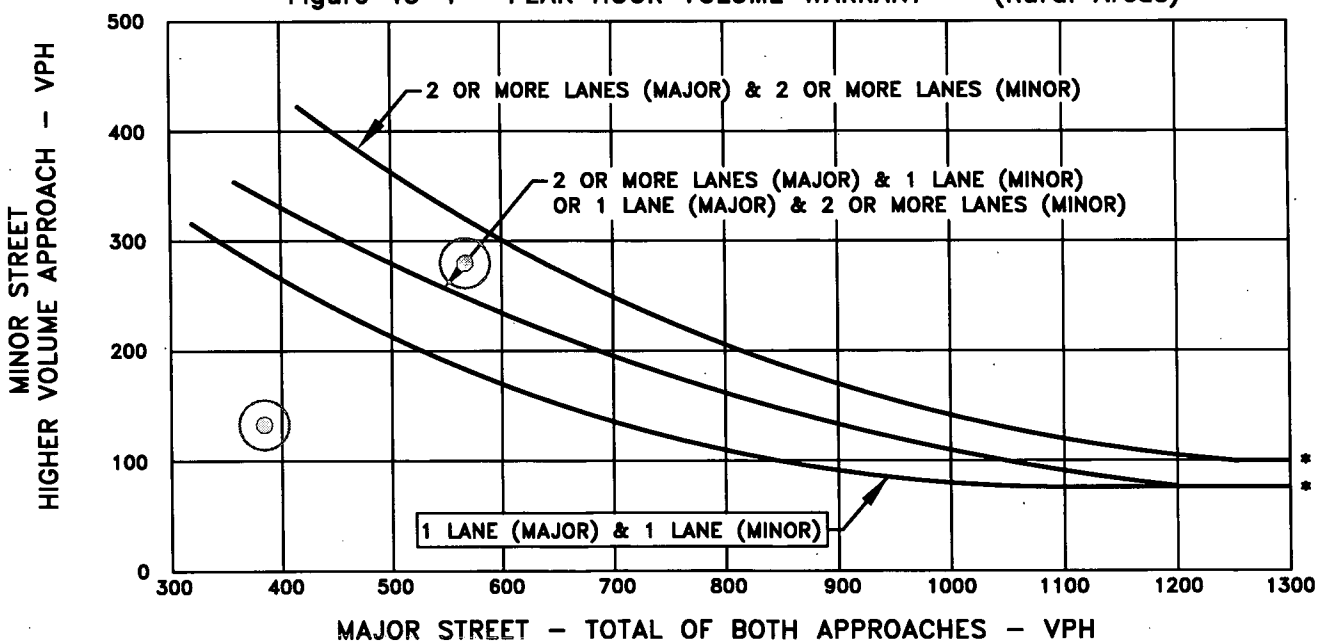
CONDITION: 2008 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		383	567				
Highest Approaches – Minor Street	✓		133	280				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 17 Critical Approach Speed 45 mph

MINOR STREET: GOLDEN STATE BOULEVARD Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

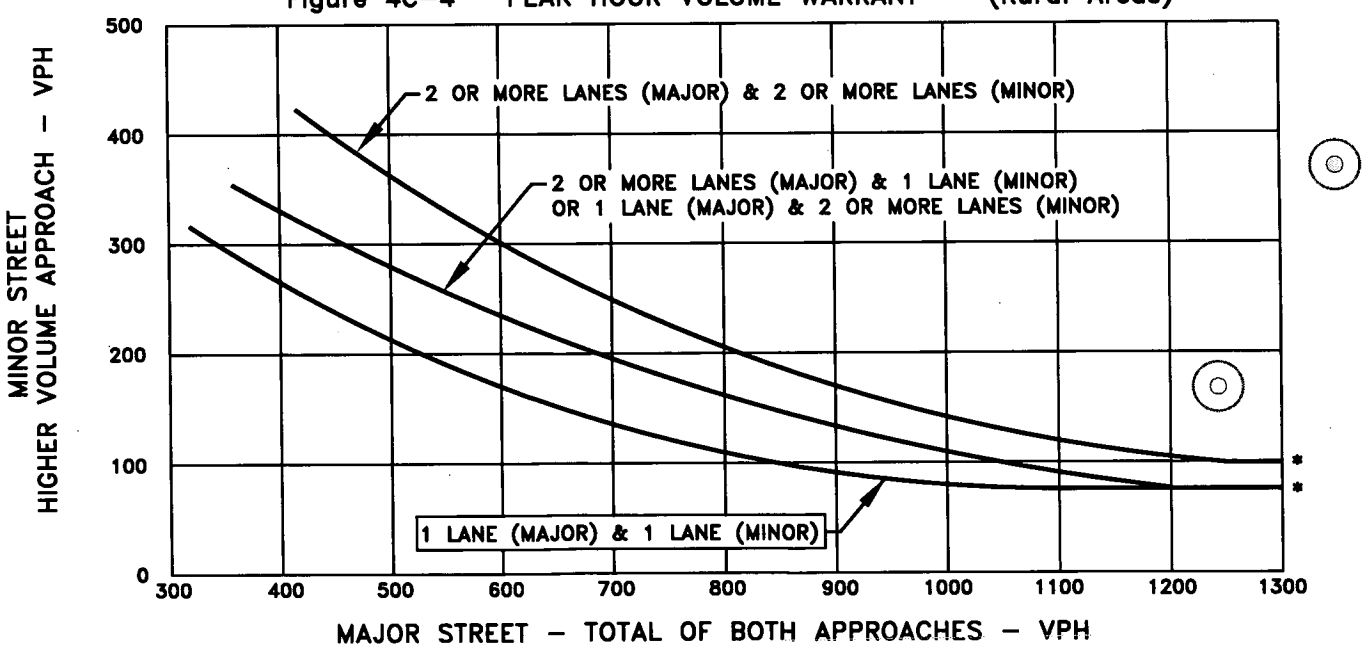
CONDITION: 2008 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		1243	2231				
Highest Approaches – Minor Street	✓		168	369				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 26 Critical Approach Speed 40 mph

MINOR STREET: ELLIS STREET Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

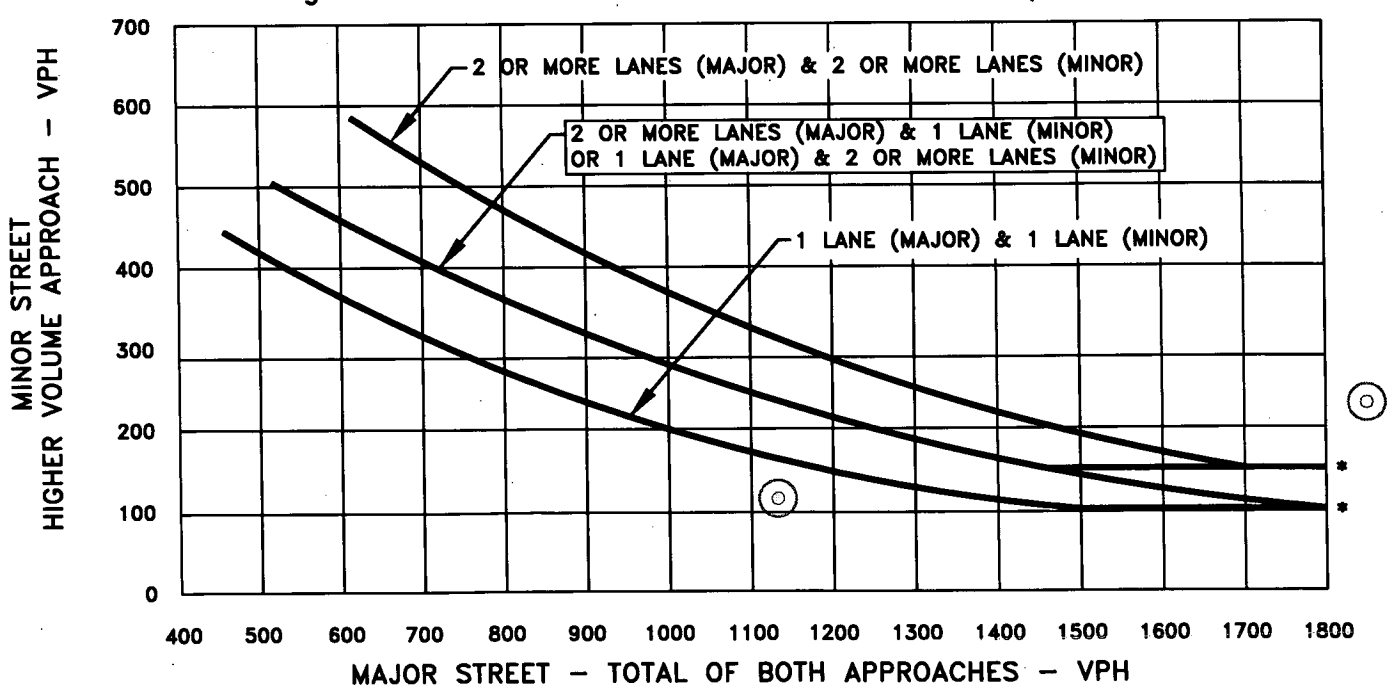
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		1132	1919			
Highest Approaches – Minor Street		✓	114	230			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 15 1/2 Critical Approach Speed NPS mph

MINOR STREET: ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

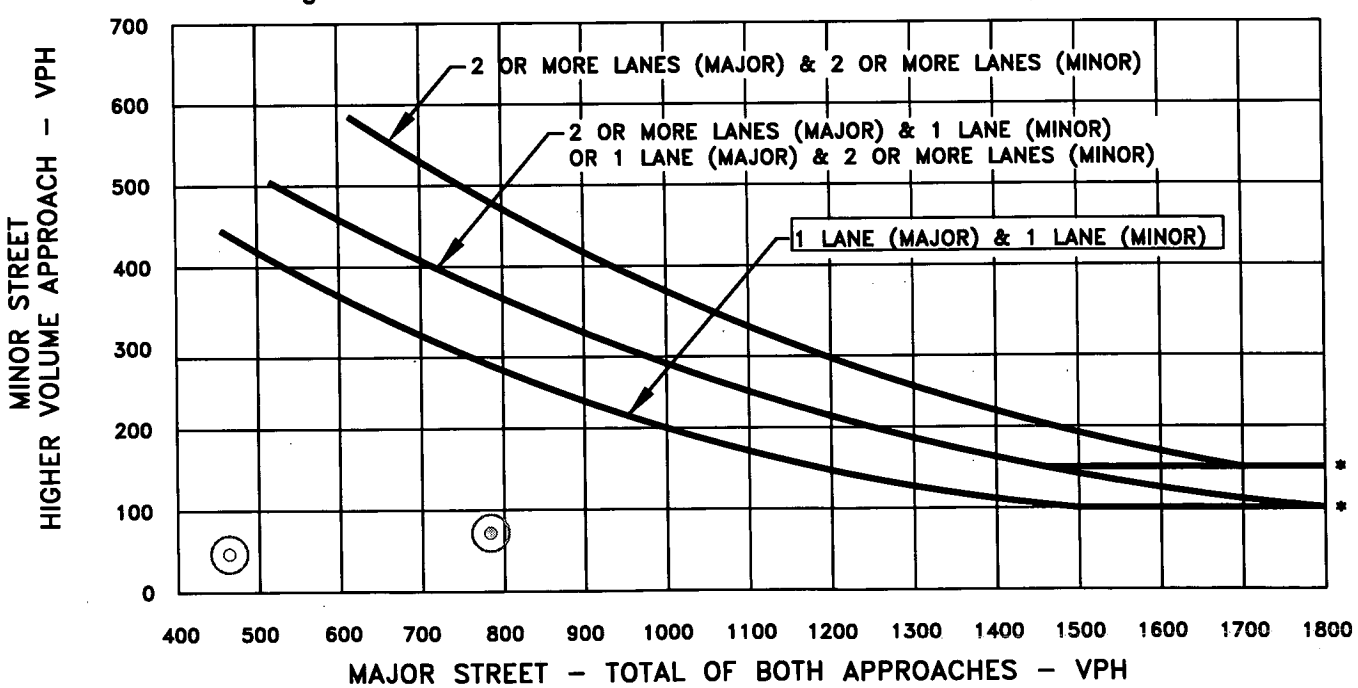
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		463	783			
Highest Approaches – Minor Street	✓		47	72			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 14 Critical Approach Speed NPS mph

MINOR STREET: ROAD 23 Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------- [X] or [ ] RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

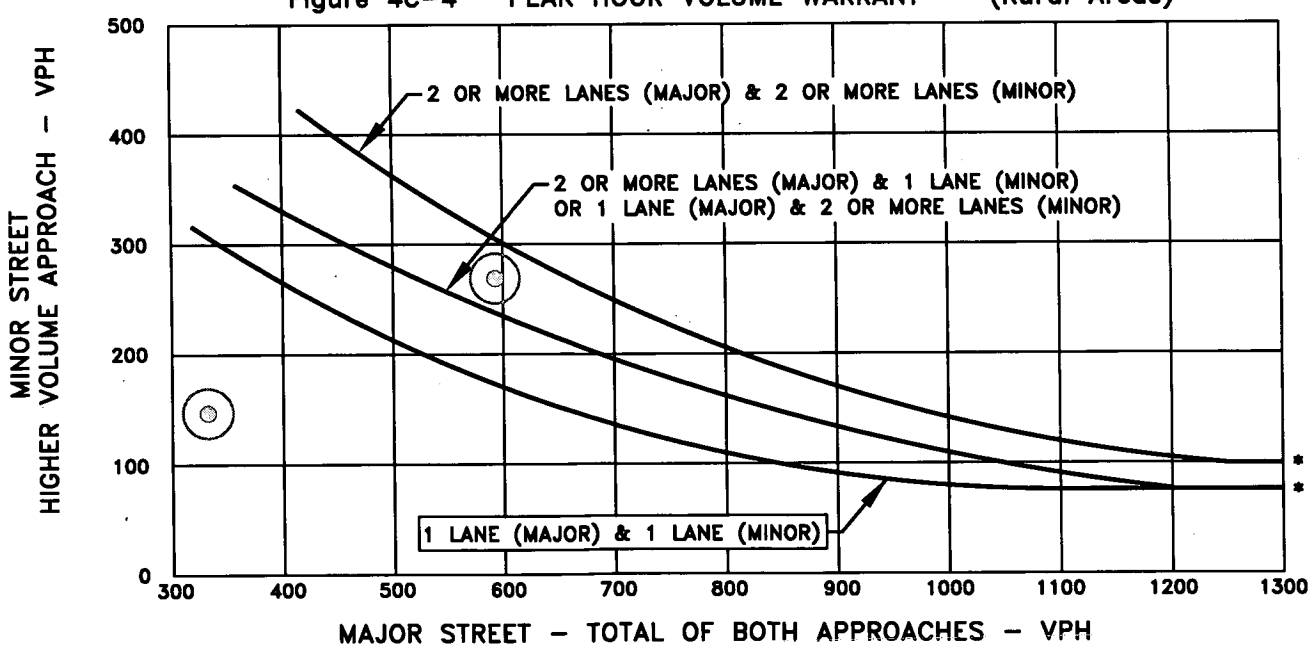
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		332	593				
Highest Approaches – Minor Street	✓		147	269				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 16 Critical Approach Speed 45/40 mph

MINOR STREET: SCHNOOR AVENUE Critical Approach Speed 40/40 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

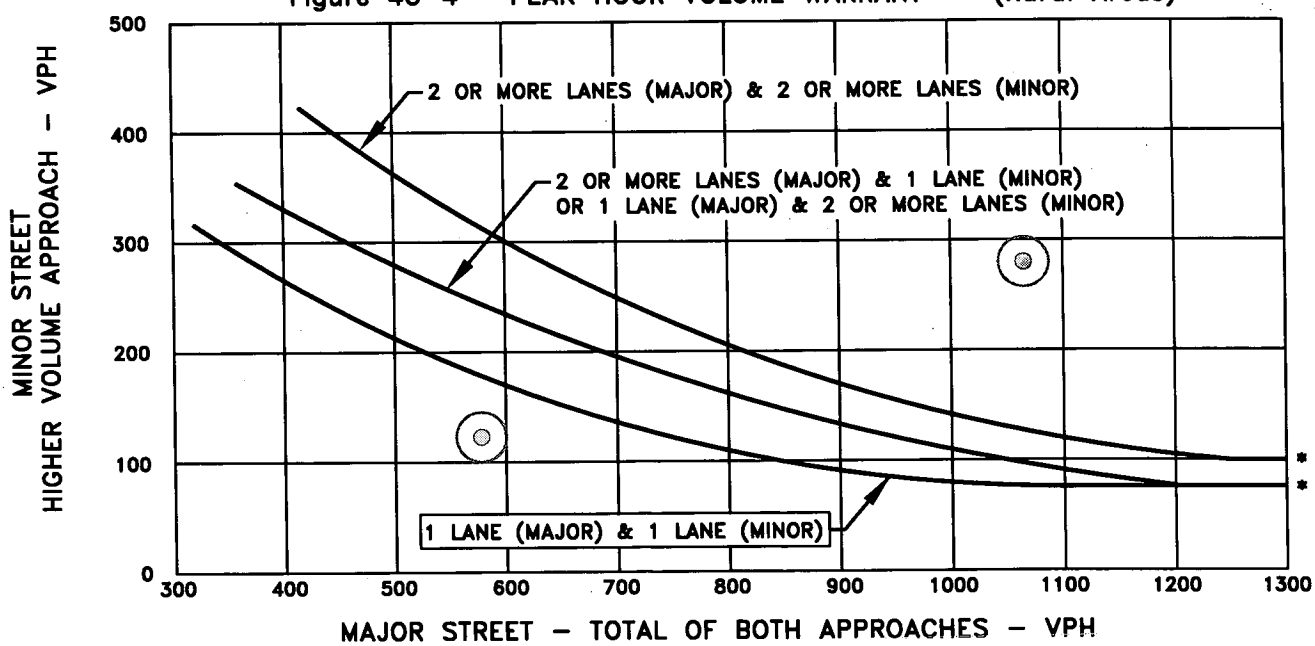
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		578	1065				
Highest Approaches – Minor Street	✓		123	280				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 SB Critical Approach Speed NPS mph

MINOR STREET: AVENUE 16 Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

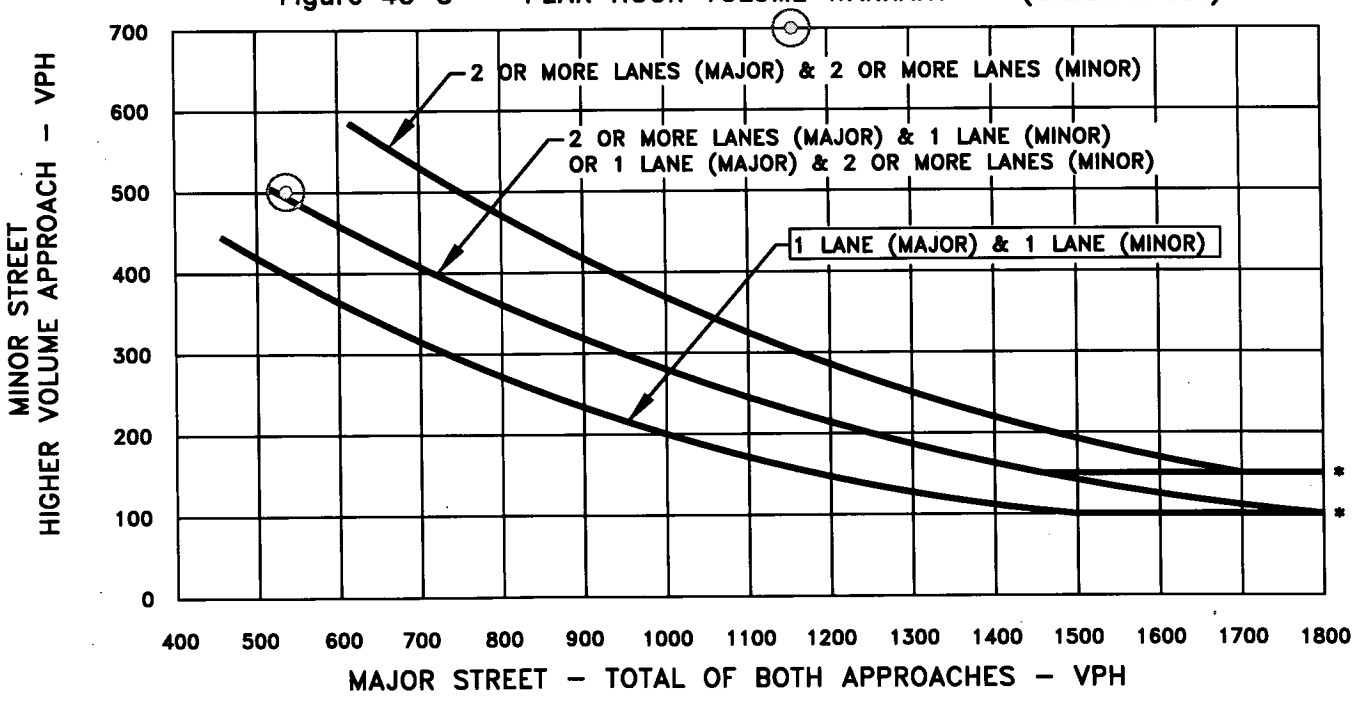
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches - Major Street	✓		536	1157			
Highest Approaches - Minor Street	✓		501	947			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 NB OFF RAMP Critical Approach Speed NPS mph

MINOR STREET: AVENUE 16 CONNECTOR Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

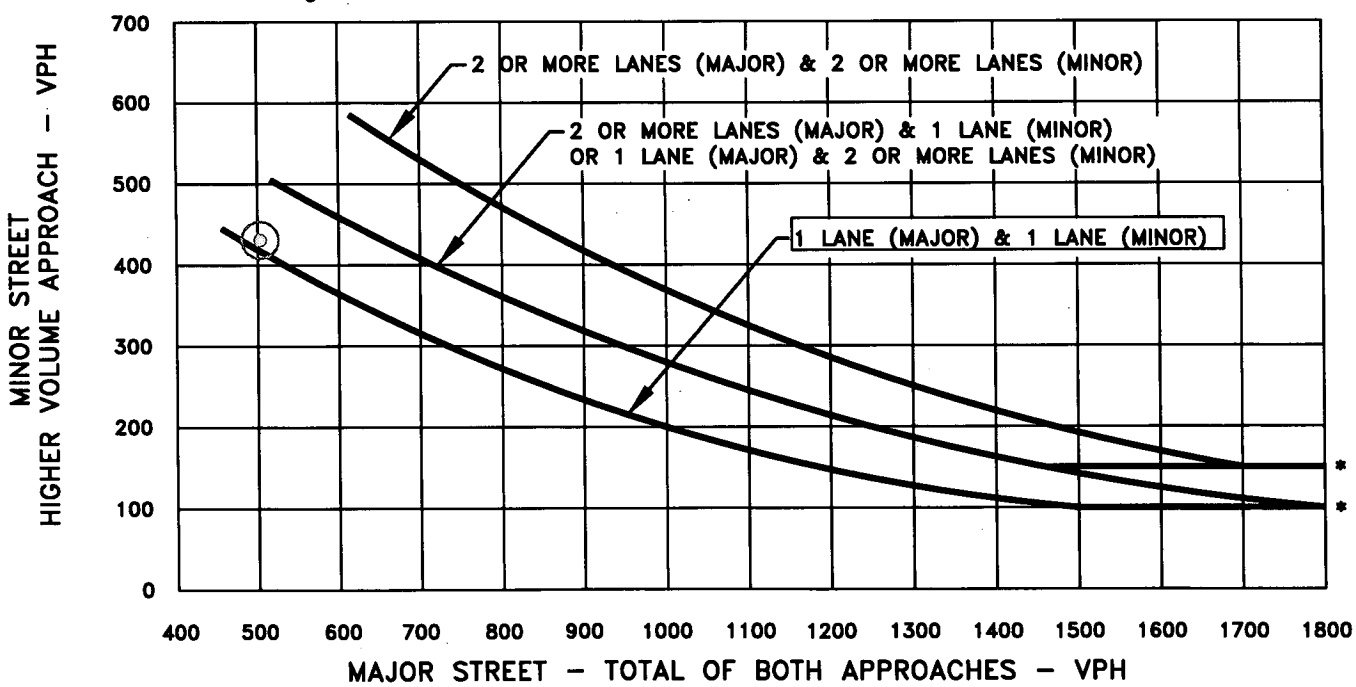
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		270	503			
Highest Approaches – Minor Street	✓		139	431			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 16 Critical Approach Speed 35 mph

MINOR STREET: SR-99 NB ON CONNECTOR Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

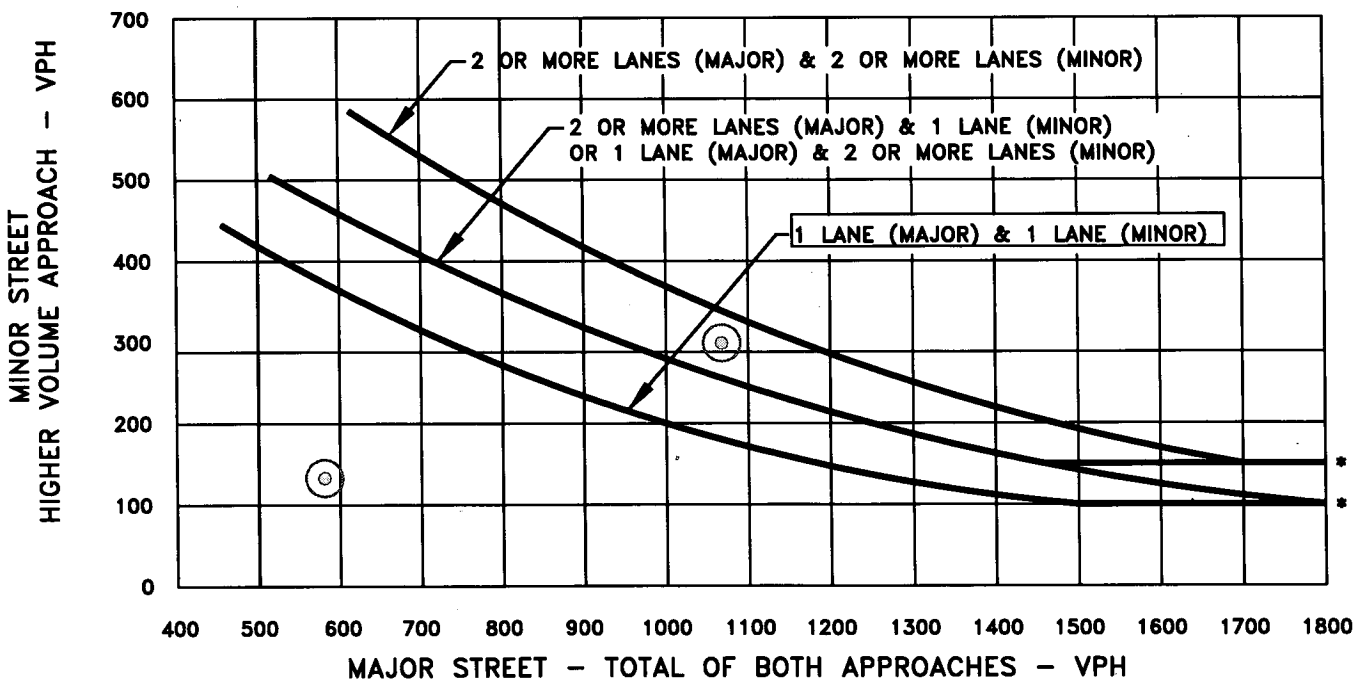
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		581	1068			
Highest Approaches – Minor Street	✓		133	299			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 NB ON RAMP Critical Approach Speed NPS mph

MINOR STREET: GATEWAY/AVENUE 16 Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

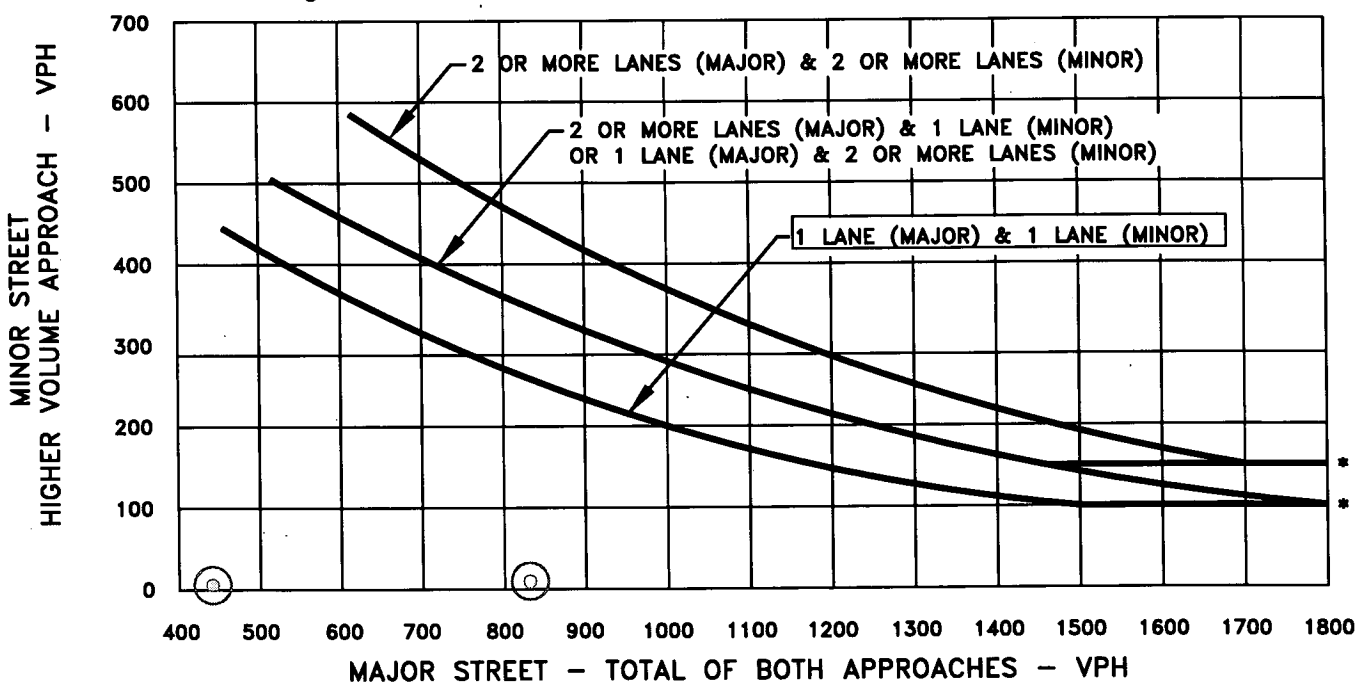
CONDITION: 2008 NO/"O" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		441	831			
Highest Approaches – Minor Street	✓		6	10			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: PISTACHIO DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

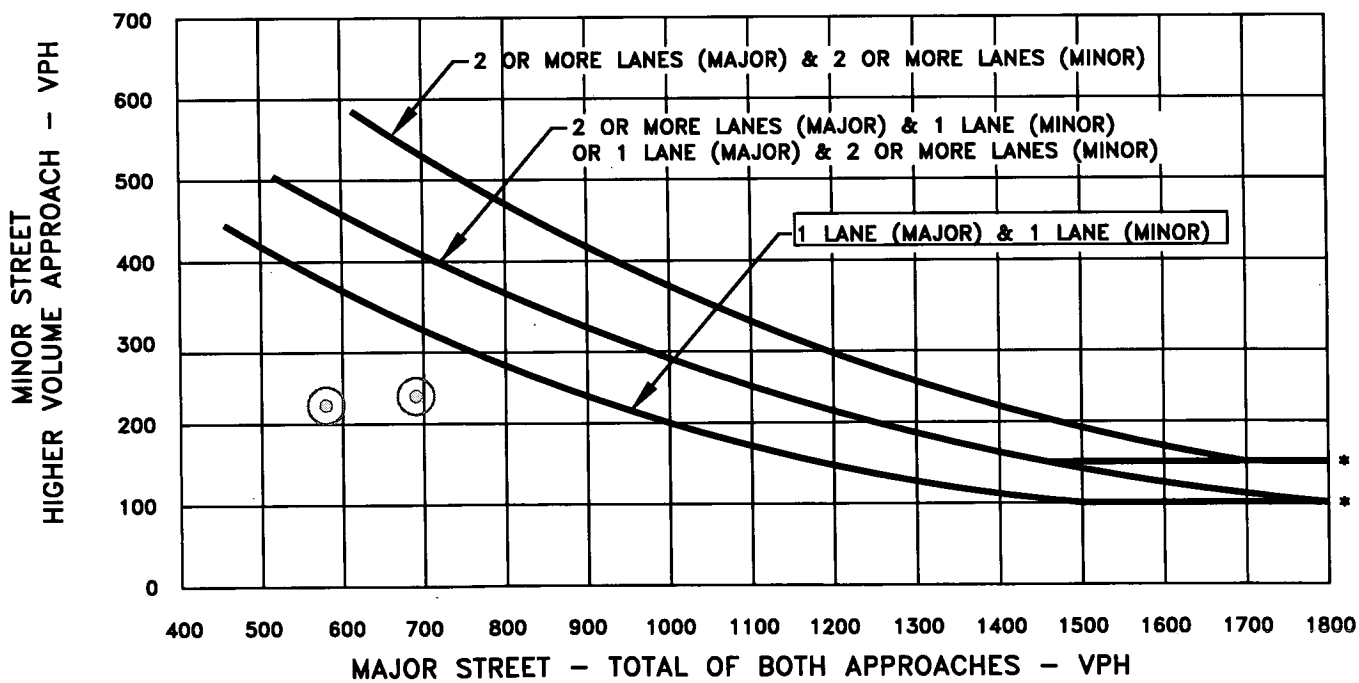
CONDITION: 2008 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		579	690			
Highest Approaches – Minor Street	✓		223	234			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: GOLDEN STATE BLVD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

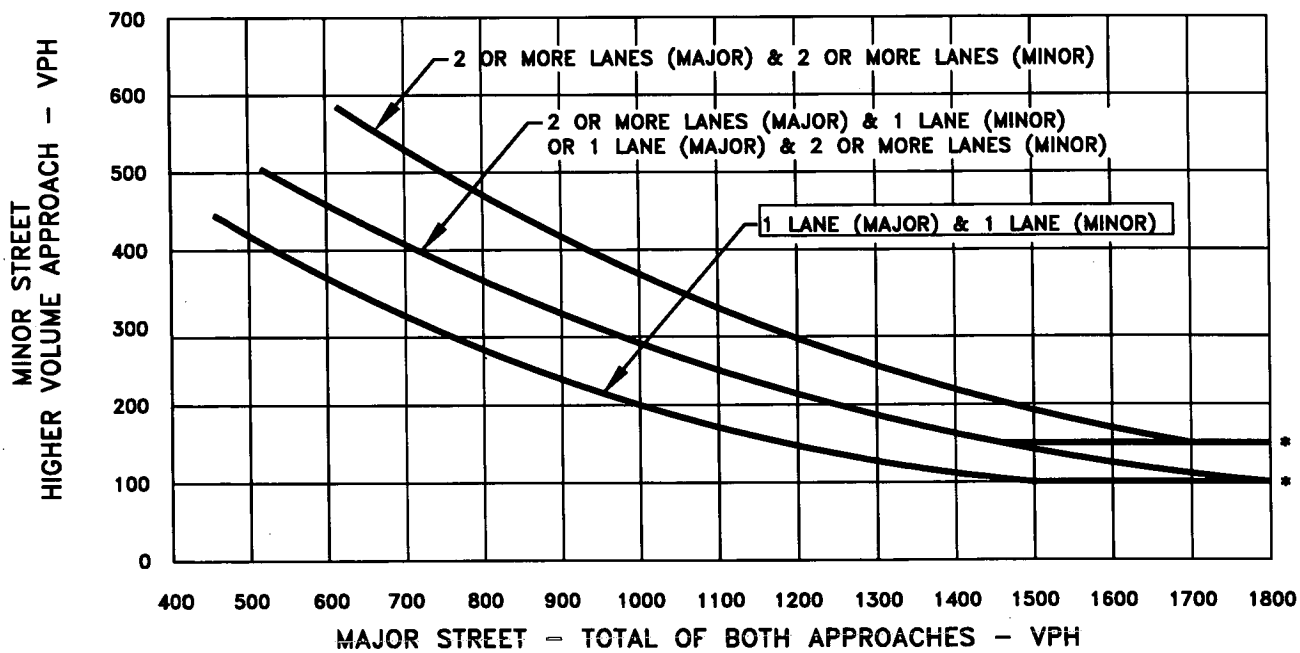
CONDITION: 2008 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		219	344			
Highest Approaches – Minor Street	✓		100	109			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

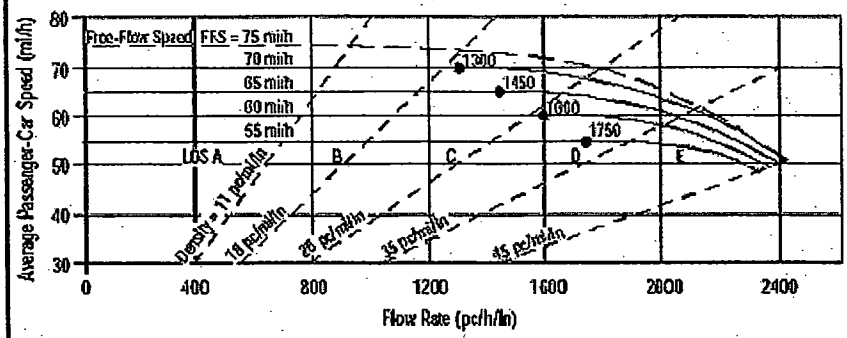
ATTACHMENT VI – C - 8

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2975*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1858*	pc/h/ln
S	*67.1*	mi/h
D = v_p / S	*27.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

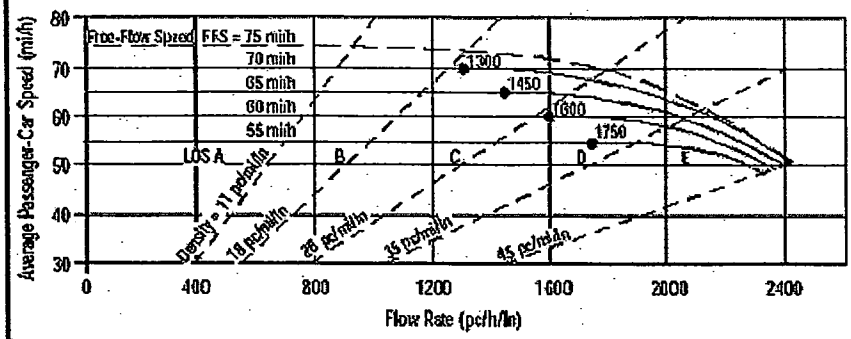
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs				
Volume, V	*3083*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

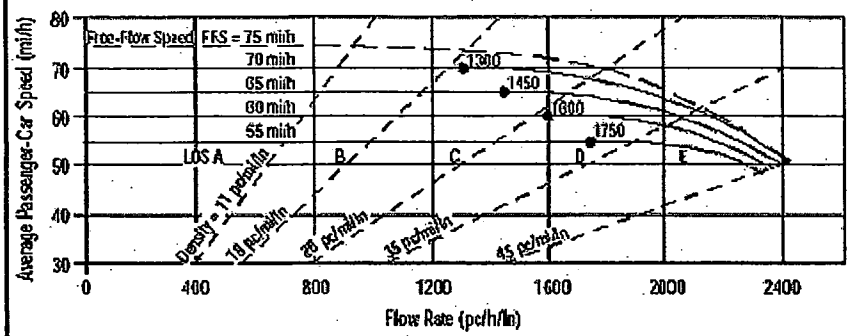
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1925*	pc/h/ln	Design LOS		
S	*66.2*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*29.1*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

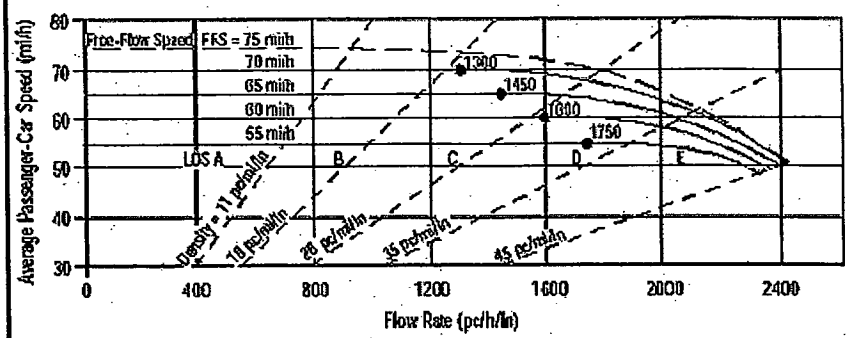
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1538*	pc/h/ln	Design LOS		
S	*69.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*22.1*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3715*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

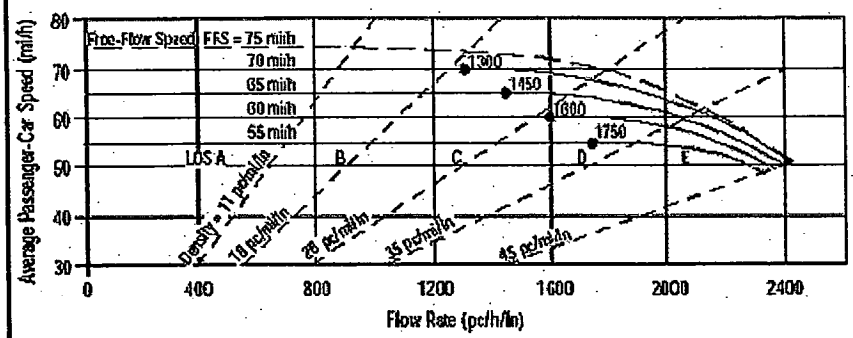
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2320*	pc/h/ln	Design LOS		
S	*56.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*41.2*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2749*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1717*	pc/h/ln
S	*68.7*	mi/h
D = v_p / S	*25.0*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

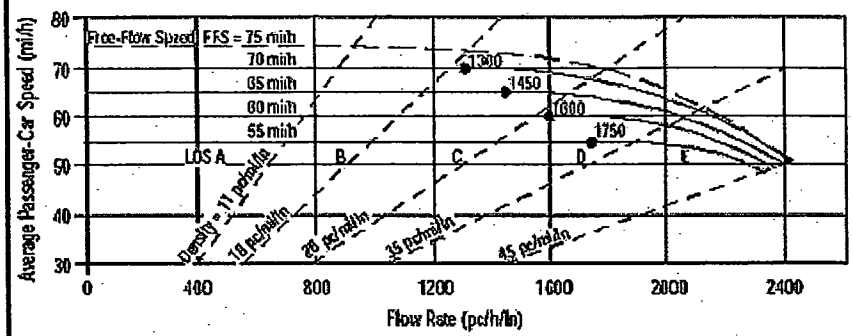
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2924*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

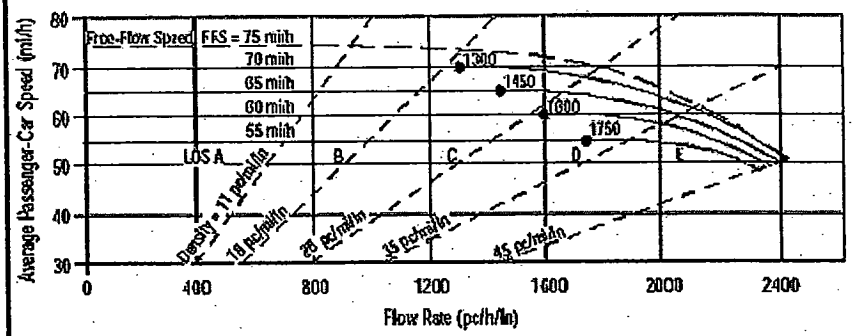
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1826*	pc/h/ln	Design LOS		
S	*67.6*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*27.0*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*W Hutcheson*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*9/24/2005*
Analysis Time Period	*2008 Project AM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*North of Avenue 18 1/2*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2324*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1451*	pc/h/ln
S	*69.9*	mi/h
D = v_p / S	*20.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

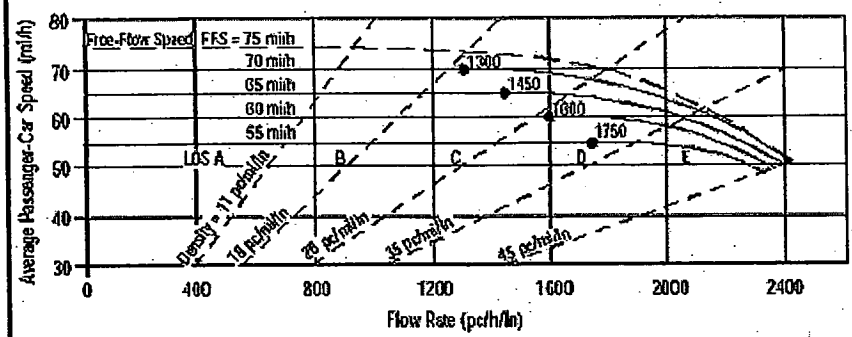
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*W Hutcheson*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*9/24/2005*
Analysis Time Period	*2008 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*North of Avenue 18 1/2*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3502*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2187*	pc/h/ln
S	*60.5*	mi/h
D = v_p / S	*36.2*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

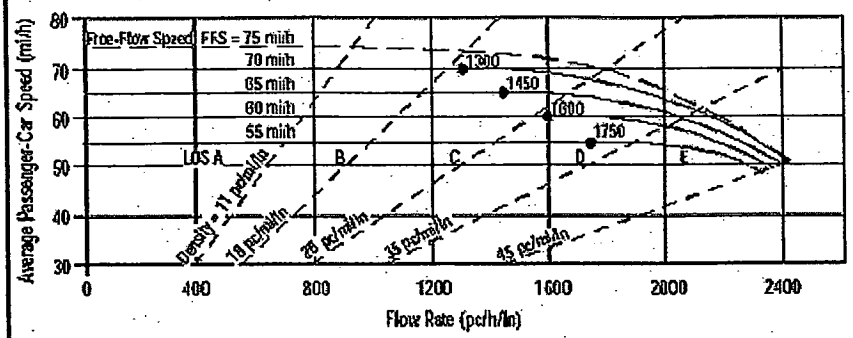
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period		Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3543*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

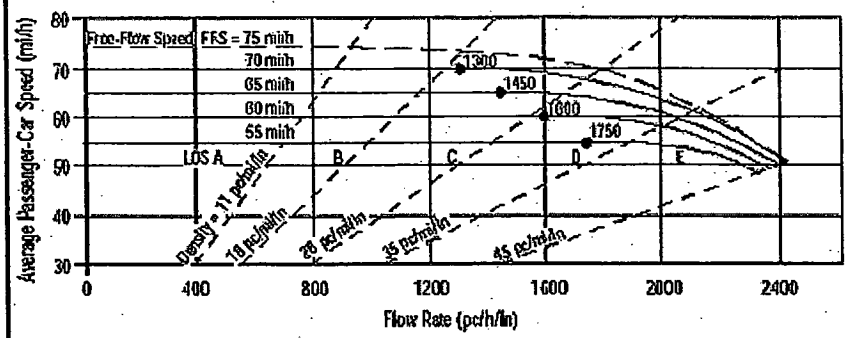
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2212*	pc/h/ln	Design LOS		
S	*59.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*37.0*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4271*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2667*	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

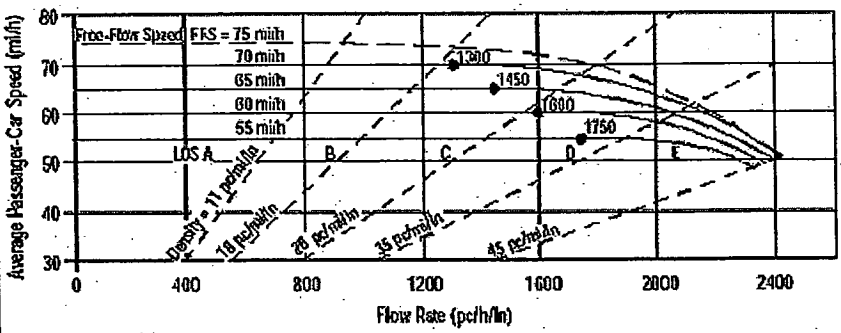
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*W Hutcheson*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*9/24/2005*
Analysis Time Period	*2008 Project AM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2725*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1702*	pc/h/ln
S	*68.8*	mi/h
D = v_p / S	*24.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

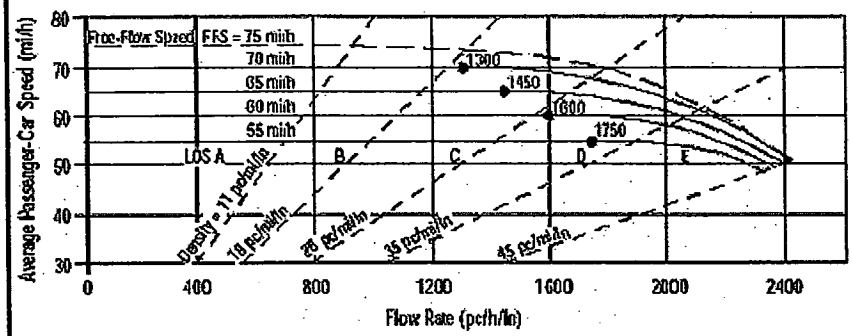
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*W Hutcheson*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*9/24/2005*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4840*	veh/h	Peak-Hour Factor, PHF	*0.90*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*3022*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 9

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

INTERSECTION LEVEL OF SERVICE CALCULATIONS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1

East/West Street: Avenue 18-1/2 | North/South Street: 99 SB offramp / Road 23

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		355	71	37	256	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	403	80	42	290	0
Percent Heavy Vehicles	0	--	--	29	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	64		134	12	139	66
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	72	0	152	13	157	75
Percent Heavy Vehicles	20	0	20	37	37	37
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		42	72		152		245	
C (m) (veh/h)		953	96		579		295	
v/c		0.04	0.75		0.26		0.83	
95% queue length		0.14	3.91		1.05		6.96	
Control Delay (s/veh)		9.0	112.0		13.4		56.6	
LOS		A	F		B		F	
Approach Delay (s/veh)	--	--	45.1			56.6		
Approach LOS	--	--	E			F		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/29/2006 5:10 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1

East/West Street: Avenue 18-1/2	North/South Street: 99 SB offramp / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		372	76	52	288	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	422	86	59	327	0
Percent Heavy Vehicles	0	–	–	22	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	65		226	36	194	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	73	0	256	40	220	144
Percent Heavy Vehicles	20	0	20	45	45	45
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		59	73		256		404	
C (m) (veh/h)		962	0		562		229	
v/c		0.06			0.46		1.76	
95% queue length		0.20			2.36		27.40	
Control Delay (s/veh)		9.0			16.7		397.7	
LOS		A	F		C		F	
Approach Delay (s/veh)	–	–				397.7		
Approach LOS	–	–				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	200	58			99	24
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	227	65	0	0	112	27
Percent Heavy Vehicles	48	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	242	0	22			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	275	0	25	0	0	0
Percent Heavy Vehicles	35	35	35	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	227			300				
C (m) (veh/h)	1205			334				
v/c	0.19			0.90				
95% queue length	0.69			8.69				
Control Delay (s/veh)	8.7			62.7				
LOS	A			F				
Approach Delay (s/veh)	–	–	62.7					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1

East/West Street: Avenue 18-1/2 | North/South Street: SR 99 NB ramps

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	275	97			131	10
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	312	110	0	0	148	11
Percent Heavy Vehicles	19	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	285	0	46			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	323	0	52	0	0	0
Percent Heavy Vehicles	20	20	20	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	312			375				
C (m) (veh/h)	1323			249				
v/c	0.24			1.51				
95% queue length	0.92			22.11				
Control Delay (s/veh)	8.6			284.2				
LOS	A			F				
Approach Delay (s/veh)	--	--	284.2					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/29/2006 5:09 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt A
East/West Street: Avenue 17	North/South Street: SR 99 SB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		723			1059	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	821	0	0	1203	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				135		62
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	153	0	70
Percent Heavy Vehicles	0	0	0	6	0	6
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						153		70
C (m) (veh/h)						62		220
v/c						2.47		0.32
95% queue length						15.16		1.31
Control Delay (s/veh)						809.9		28.8
LOS						F		D
Approach Delay (s/veh)	--	--				564.7		
Approach LOS	--	--				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 17 | North/South Street: SR 99 SB ramps

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1737			1608	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	1973	0	0	1827	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				282		74
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	320	0	84
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						320		84
C (m) (veh/h)						4		92
v/c						80.00		0.91
95% queue length						42.33		5.13
Control Delay (s/veh)						37344		152.9
LOS						F		F
Approach Delay (s/veh)	--	--				29611		
Approach LOS	--	--				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 17 | North/South Street: SR 99 NB ramps

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	42	298			814	64
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	47	338	0	0	925	72
Percent Heavy Vehicles	3	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	695	36	271			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	789	40	307	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	47		829		307			
C (m) (veh/h)	690		144		704			
v/c	0.07		5.76		0.44			
95% queue length	0.22		89.11		2.22			
Control Delay (s/veh)	10.6		2200		14.0			
LOS	B		F		B			
Approach Delay (s/veh)	--	--	1610					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	57	860			1325	194
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	64	977	0	0	1505	220
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	955	0	1011			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	1085	0	1148	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	64		1085		1148			
C (m) (veh/h)	366		19		304			
v/c	0.17		57.11		3.78			
95% queue length	0.63		136.24		109.43			
Control Delay (s/veh)	16.9		25633		1282			
LOS	C		F		F			
Approach Delay (s/veh)	--	--	13114					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		89	125	209	25	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	71	0	243
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				63		214
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	237	28	0	0	101	142
Percent Heavy Vehicles	0	0	0	11	0	11
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		237		314				
C (m) (veh/h)		1289		627				
v/c		0.18		0.50				
95% queue length		0.67		2.81				
Control Delay (s/veh)		8.4		16.4				
LOS		A		C				
Approach Delay (s/veh)	--	--	16.4					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		143	152	246	35	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	193	0	710
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				170		625
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	279	39	0	0	162	172
Percent Heavy Vehicles	0	0	0	5	0	5
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		279		903				
C (m) (veh/h)		1182		539				
v/c		0.24		1.68				
95% queue length		0.92		52.01				
Control Delay (s/veh)		9.0		331.3				
LOS		A		F				
Approach Delay (s/veh)	--	--	331.3					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Avenue 12 @ Golden State Blvd
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 12 | North/South Street: Golden State Blvd

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	180	249	24	83	292	29
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	195	270	26	90	317	31
Percent Heavy Vehicles	10	--	--	6	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	1	1	0
Configuration	L	T	R	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	70	5	288	61	5	22
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	76	5	313	66	5	23
Percent Heavy Vehicles	12	12	12	5	5	5
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	195	90	81		313	71		23
C (m) (veh/h)	1168	1243	124		745	62		703
v/c	0.17	0.07	0.65		0.42	1.15		0.03
95% queue length	0.60	0.23	3.44		2.09	5.75		0.10
Control Delay (s/veh)	8.7	8.1	76.9		13.3	271.8		10.3
LOS	A	A	F		B	F		B
Approach Delay (s/veh)	--	--	26.4			207.8		
Approach LOS	--	--	D			F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Avenue 12 @ Golden State Blvd
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 12 | North/South Street: Golden State Blvd

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	276	418	14	101	344	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	299	454	15	109	373	10
Percent Heavy Vehicles	7	--	--	6	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	1	1	0
Configuration	L	T	R	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	149	9	288	174	9	33
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	161	9	313	189	9	35
Percent Heavy Vehicles	7	7	7	7	7	7
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	299	109	170		313	198		35
C (m) (veh/h)	1149	1072	47		596	19		658
v/c	0.26	0.10	3.62		0.53	10.42		0.05
95% queue length	1.05	0.34	18.77		3.05	25.31		0.17
Control Delay (s/veh)	9.2	8.7	1357		17.5	4634		10.8
LOS	A	A	F		C	F		B
Approach Delay (s/veh)	--	--	489.0			3940		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.986			0.852				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		7			313				24
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	180	249	24	83	292	29	70	5	288	61	5	22
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	196	271	26	90	317	32	76	5	313	66	5	24
Lane Group Flow (vph)	196	271	26	90	349	0	76	318	0	66	5	24
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	16.0	26.4	26.4	13.4	23.8	0.0	9.6	21.2	0.0	9.0	20.6	20.6
Total Split (%)	22.9%	37.7%	37.7%	19.1%	34.0%	0.0%	13.7%	30.3%	0.0%	12.9%	29.4%	29.4%
Maximum Green (s)	11.4	21.8	21.8	8.8	19.2		5.0	16.6		4.4	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	11.4	35.0	35.0	8.8	30.3		5.7	9.1		5.2	8.6	8.6
Actuated g/C Ratio	0.16	0.50	0.50	0.13	0.43		0.08	0.13		0.07	0.12	0.12
v/c Ratio	0.73	0.31	0.03	0.42	0.45		0.58	0.69		0.51	0.02	0.11
Control Delay	45.6	15.0	6.5	30.4	15.0		50.5	12.2		47.2	24.0	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.6	15.0	6.5	30.4	15.0		50.5	12.2		47.2	24.0	11.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	B	A	C	B		D	B		D	C	B
Approach Delay		26.7			18.1			19.6			37.0	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	80	70	0	39	93		32	2		28	2	0
Queue Length 95th (ft)	#169	155	15	m55	m200		#89	61		#78	10	17
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	281	863	746	229	768		132	591		129	429	383
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.70	0.31	0.03	0.39	0.45		0.58	0.54		0.51	0.01	0.06

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 12 (17%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 22.8 Intersection LOS: C
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.896		0.921			
Flt Protected	0.989					0.957
Satd. Flow (prot)	1517	0	1716	0	0	1783
Flt Permitted	0.989					0.957
Satd. Flow (perm)	1517	0	1716	0	0	1783
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	63	214	89	125	209	25
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	72	243	101	142	238	28
Lane Group Flow (vph)	315	0	243	0	0	266
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 51.9% ICU Level of Service A
Analysis Period (min) 15

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.919				0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1679	0	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1679	0	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					150				89			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	104	494	0	0	249	374	155	4	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	118	561	0	0	283	425	176	5	89	0	0	0
Lane Group Flow (vph)	118	561	0	0	708	0	0	181	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	11.4	49.4	0.0	0.0	38.0	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	16.3%	70.6%	0.0%	0.0%	54.3%	0.0%	29.4%	29.4%	29.4%	0.0%	0.0%	0.0%
Maximum Green (s)	6.8	44.8			33.4		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	7.3	49.0			39.9			13.0	13.0			
Actuated g/C Ratio	0.10	0.70			0.57			0.19	0.19			
v/c Ratio	0.64	0.43			0.69			0.60	0.26			
Control Delay	41.6	3.8			14.8			34.4	7.9			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	41.6	3.8			14.8			34.4	7.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B			C	A			
Approach Delay		10.4			14.8			25.6				
Approach LOS		B			B			C				
Queue Length 50th (ft)	51	45			168			72	0			
Queue Length 95th (ft)	m#93	52			#330			121	31			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	185	1293			1022			384	410			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.64	0.43			0.69			0.47	0.22			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 14.8 Intersection LOS: B
Intersection Capacity Utilization 60.6% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps

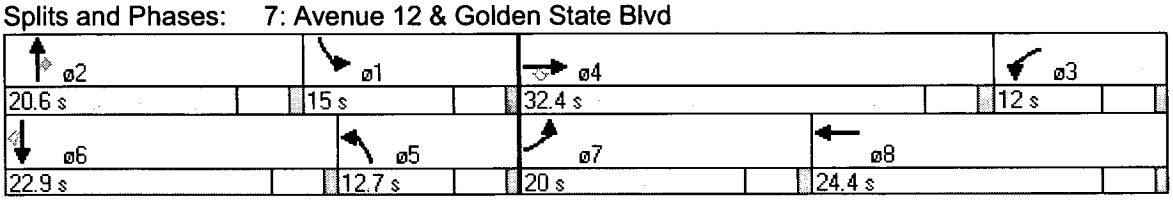
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		2				313			36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	276	418	14	101	344	10	149	9	288	174	9	33
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	300	454	15	110	374	11	162	10	313	189	10	36
Lane Group Flow (vph)	300	454	15	110	385	0	162	10	313	189	10	36
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Detector Phases	7	4	4	3	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	20.0	32.4	32.4	12.0	24.4	0.0	12.7	20.6	20.6	15.0	22.9	22.9
Total Split (%)	25.0%	40.5%	40.5%	15.0%	30.5%	0.0%	15.9%	25.8%	25.8%	18.8%	28.6%	28.6%
Maximum Green (s)	15.4	27.8	27.8	7.4	19.8		8.1	16.0	16.0	10.4	18.3	18.3
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	17.5	35.4	35.4	7.9	23.4		16.2	8.9	8.9	14.2	6.9	6.9
Actuated g/C Ratio	0.22	0.44	0.44	0.10	0.29		0.20	0.11	0.11	0.18	0.09	0.09
v/c Ratio	0.81	0.58	0.02	0.66	0.73		0.48	0.05	0.70	0.63	0.07	0.22
Control Delay	49.7	23.0	8.6	45.8	31.7		32.2	29.4	13.1	41.9	33.9	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	23.0	8.6	45.8	31.7		32.2	29.4	13.1	41.9	33.9	15.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	C		C	C	B	D	C	B
Approach Delay		33.1			34.8			19.8			37.5	
Approach LOS		C			C			B			D	
Queue Length 50th (ft)	136	174	0	55	183		71	5	0	85	5	0
Queue Length 95th (ft)	#289	302	12	m71	m#275		124	17	65	#192	19	26
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	373	785	675	170	525		341	369	561	300	420	384
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.58	0.02	0.65	0.73		0.48	0.03	0.56	0.63	0.02	0.09

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 30 (38%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 30.8 Intersection LOS: C
Intersection Capacity Utilization 60.3% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.894		0.930			
Flt Protected	0.989					0.958
Satd. Flow (prot)	1600	0	1732	0	0	1655
Flt Permitted	0.989					0.958
Satd. Flow (perm)	1600	0	1732	0	0	1655
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	170	625	143	152	246	35
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	193	710	163	173	280	40
Lane Group Flow (vph)	903	0	335	0	0	320
Sign Control	Free		Free			Stop

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 90.2% ICU Level of Service E
Analysis Period (min) 15

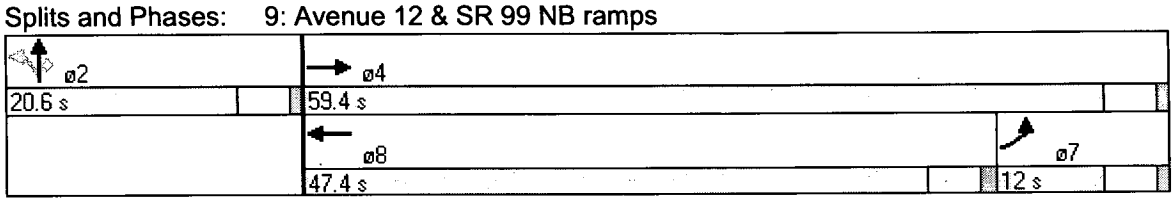
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.915				0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1656	0	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1656	0	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					168				149			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	114	766	0	0	280	477	174	1	131	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	130	870	0	0	318	542	198	1	149	0	0	0
Lane Group Flow (vph)	130	870	0	0	860	0	0	199	149	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	12.0	59.4	0.0	0.0	47.4	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	15.0%	74.3%	0.0%	0.0%	59.3%	0.0%	25.8%	25.8%	25.8%	0.0%	0.0%	0.0%
Maximum Green (s)	7.4	54.8			42.8		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	8.0	57.9			45.9			14.1	14.1			
Actuated g/C Ratio	0.10	0.72			0.57			0.18	0.18			
v/c Ratio	0.76	0.66			0.84			0.68	0.39			
Control Delay	52.3	4.2			21.6			42.7	8.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	52.3	4.2			21.6			42.7	8.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			C			D	A			
Approach Delay		10.4			21.6			27.9				
Approach LOS		B			C			C				
Queue Length 50th (ft)	66	45			277			93	0			
Queue Length 95th (ft)	m#128	107			#545			153	43			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	172	1310			1022			345	426			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.76	0.66			0.84			0.58	0.35			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 17.5 Intersection LOS: B
Intersection Capacity Utilization 70.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 18 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	169	2	86	160	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	8	8	1	14	46
Percent Heavy Vehicles	11	--	--	19	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	8	8	1	13	43
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	93	173	2	16	183	2
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	93		61			19	
C (m) (veh/h)	1349	1294		664			497	
v/c	0.01	0.07		0.09			0.04	
95% queue length	0.04	0.23		0.30			0.12	
Control Delay (s/veh)	7.7	8.0		11.0			12.5	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	11.0			12.5		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 18 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 18 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	236	4	113	253	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	11	5	2	10	116
Percent Heavy Vehicles	13	--	--	15	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	11	5	2	10	107
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	122	274	1	15	256	4
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	15	122		128			17	
C (m) (veh/h)	1227	1233		668			331	
v/c	0.01	0.10		0.19			0.05	
95% queue length	0.04	0.33		0.70			0.16	
Control Delay (s/veh)	8.0	8.2		11.7			16.5	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	11.7			16.5		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 17	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	182	107	23	123	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	47	9	118	19	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	44	9	109	18	11
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	24	133	1	5	197	116
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	24		148			59	
C (m) (veh/h)	1451	1247		468			497	
v/c	0.00	0.02		0.32			0.12	
95% queue length	0.01	0.06		1.34			0.40	
Control Delay (s/veh)	7.5	7.9		16.2			13.2	
LOS	A	A		C			B	
Approach Delay (s/veh)	--	--	16.2			13.2		
Approach LOS	--	--	C			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 17 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	6	194	226	37	194	6
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	7	91	21	222	55	32
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	7	84	20	205	51	30
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	40	210	6	6	210	245
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	6	40		309			119	
C (m) (veh/h)	1354	1106		298			357	
v/c	0.00	0.04		1.04			0.33	
95% queue length	0.01	0.11		11.47			1.43	
Control Delay (s/veh)	7.7	8.4		100.9			20.0	
LOS	A	A		F			C	
Approach Delay (s/veh)	--	--	100.9			20.0		
Approach LOS	--	--	F			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	26	392	49	140	545	400
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	28	426	53	152	592	434
Percent Heavy Vehicles	2	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	61	45	104	203	24	16
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	66	48	113	220	26	17
Percent Heavy Vehicles	21	21	21	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	28	152	66		161		263	
C (m) (veh/h)	677	1073	32		118		0	
v/c	0.04	0.14	2.06		1.36			
95% queue length	0.13	0.49	7.53		10.91			
Control Delay (s/veh)	10.5	8.9	758.5		277.0			
LOS	B	A	F		F		F	
Approach Delay (s/veh)	--	--	417.0					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	38	875	84	212	819	587
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	41	951	91	230	890	638
Percent Heavy Vehicles	2	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	76	101	245	608	61	34
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	82	109	266	660	66	36
Percent Heavy Vehicles	4	4	4	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	41	230	82		375		762	
C (m) (veh/h)	436	641			0			
v/c	0.09	0.36						
95% queue length	0.31	1.63						
Control Delay (s/veh)	14.1	13.7						
LOS	B	B			F			
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt A

East/West Street: Ellis

North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	30	3	12	16	0	110
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	27	662	10	82	359	15
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	48		136		388	369	283	211
% Heavy Vehicles	8		8		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.7		0.1		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.3		0.9		0.0	0.0	0.0	0.1
Prop. Heavy Vehicle	0.1		0.1		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	0.0	0.2	-0.0

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.04		0.12		0.34	0.33	0.25	0.19
hd, final value (s)	6.93		6.17		5.86	5.81	6.29	6.08
x, final value	0.09		0.23		0.63	0.60	0.49	0.36
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	4.9		4.2		3.6	3.5	4.0	3.8

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	298		386		607	613	533	461
Delay (s/veh)	10.64		11.04		18.08	16.67	15.00	12.11
LOS	B		B		C	C	B	B
Approach: Delay (s/veh)	10.64		11.04		17.39		13.76	
LOS	B		B		C		B	
Intersection Delay (s/veh)	15.31							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt A

East/West Street: Ellis

North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	40	12	10	48	4	191
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	39	653	70	177	927	97
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	66		263		396	431	695	609
% Heavy Vehicles	2		2		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.7		0.2		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.2		0.8		0.0	0.2	0.0	0.2
Prop. Heavy Vehicle	0.0		0.0		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	-0.1	0.2	-0.1

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.06		0.23		0.35	0.38	0.62	0.54
hd, final value (s)	8.35		6.94		7.46	7.28	7.35	7.09
x, final value	0.15		0.51		0.82	0.87	1.42	1.20
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	6.4		4.9		5.2	5.0	5.1	4.8

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	316		512		483	495	695	609
Delay (s/veh)	12.86		16.87		36.03	41.85	221.16	130.98
LOS	B		C		E	E	F	F
Approach: Delay (s/veh)	12.86		16.87		39.06		179.04	
LOS	B		C		E		F	
Intersection Delay (s/veh)	110.19							
Intersection LOS	F							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 15-1/2 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	266	8	0	219	21
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	1	0	26	1	23
Percent Heavy Vehicles	8	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	1	0	24	1	22
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	238	22	0	289	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	0	0		50			1	
C (m) (veh/h)	1270	1220		527			445	
v/c	0.00	0.00		0.09			0.00	
95% queue length	0.00	0.00		0.31			0.01	
Control Delay (s/veh)	7.8	8.0		12.5			13.1	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	12.5			13.1		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	378	31	1	365	90
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	2	1	28	3	46
Percent Heavy Vehicles	17	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	2	1	26	3	43
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	396	97	1	410	33
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		77			3	
C (m) (veh/h)	997	1081		406			271	
v/c	0.00	0.00		0.19			0.01	
95% queue length	0.00	0.00		0.69			0.03	
Control Delay (s/veh)	8.6	8.3		15.9			18.4	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	15.9			18.4		
Approach LOS	--	--	C			C		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	12	125	29	10	115	45
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	135	15	28	83	41
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	179		182		181		164	
% Heavy Vehicles	5		11		20		15	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.1		0.1		0.1		0.2	
Prop. Right-Turns	0.2		0.3		0.1		0.3	
Prop. Heavy Vehicle	0.0		0.1		0.2		0.1	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		0.0		0.3		0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.16		0.16		0.16		0.15	
hd, final value (s)	5.14		5.18		5.44		5.30	
x, final value	0.26		0.26		0.27		0.24	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.1		3.2		3.4		3.3	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	429		432		431		414	
Delay (s/veh)	9.90		10.01		10.47		9.97	
LOS	A		B		B		A	
Approach: Delay (s/veh)	9.90		10.01		10.47		9.97	
LOS	A		B		B		A	
Intersection Delay (s/veh)	10.09							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	34	95	49	19	160	94
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	223	20	75	229	49
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	192		295		318		382	
% Heavy Vehicles	8		4		6		16	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1		0.2		0.2	
Prop. Right-Turns	0.3		0.3		0.1		0.1	
Prop. Heavy Vehicle	0.1		0.0		0.1		0.2	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.0		-0.1		0.1		0.2	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.17		0.26		0.28		0.34	
hd, final value (s)	7.14		6.70		6.68		6.65	
x, final value	0.38		0.55		0.59		0.71	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	5.1		4.7		4.7		4.7	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	423		486		499		515	
Delay (s/veh)	14.46		17.53		18.85		24.05	
LOS	B		C		C		C	
Approach: Delay (s/veh)	14.46		17.53		18.85		24.05	
LOS	B		C		C		C	
Intersection Delay (s/veh)	19.49							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 @ Schnoor
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt A
East/West Street: Avenue 16	North/South Street: Schnoor
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	52	8	95	4	18	27
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	280	23	49	230	51	10
Percent Heavy Vehicles	2	--	--	36	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	258	22	46	212	47	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	4	19	29	56	8	103
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	56	4	230		61		352	
C (m) (veh/h)	1559	1292	682		731		678	
v/c	0.04	0.00	0.34		0.08		0.52	
95% queue length	0.11	0.01	1.49		0.27		3.02	
Control Delay (s/veh)	7.4	7.8	12.9		10.4		15.9	
LOS	A	A	B		B		C	
Approach Delay (s/veh)	--	--	12.4			15.9		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 @ Schnoor
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 16 | North/South Street: Schnoor

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	88	15	217	8	27	38
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	351	46	121	566	89	27
Percent Heavy Vehicles	13	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	323	43	112	521	82	25
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	8	29	41	95	16	235
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	95	8	566		116		518	
C (m) (veh/h)	1464	1314	460		644		492	
v/c	0.06	0.01	1.23		0.18		1.05	
95% queue length	0.21	0.02	22.63		0.65		15.66	
Control Delay (s/veh)	7.6	7.8	148.5		11.8		84.3	
LOS	A	A	F		B		F	
Approach Delay (s/veh)	--	--	125.2			84.3		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt A

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	130	385	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	239	0	6	2	108	200
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	141	418			259	6	119	217
% Heavy Vehicles	3	3			14	14	6	6
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.1	0.1	0.1	0.1
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.5			0.7	-0.5	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.13	0.37			0.23	0.01	0.11	0.19
hd, final value (s)	5.66	5.05			7.18	5.96	6.53	5.81
x, final value	0.22	0.59			0.52	0.01	0.22	0.35
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	3.7	3.1			4.9	3.7	4.2	3.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	391	668			483	256	369	467
Delay (s/veh)	10.26	14.98			17.32	8.72	11.02	11.61
LOS	B	B			C	A	B	B
Approach: Delay (s/veh)	13.79				17.12		11.40	
LOS	B				C		B	
Intersection Delay (s/veh)	13.86							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt A

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	285	680	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	524	0	10	3	196	473
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	309	739			569	10	216	514
% Heavy Vehicles	2	2			2	2	4	4
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.0	-0.6			0.5	-0.7	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.27	0.66			0.51	0.01	0.19	0.46
hd, final value (s)	7.07	6.46			8.78	7.54	7.94	7.20
x, final value	0.61	1.33			1.39	0.02	0.48	1.03
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	5.1	4.5			6.5	5.2	5.6	4.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	510	739			569	260	454	514
Delay (s/veh)	20.38	178.74			212.97	10.40	17.64	74.41
LOS	C	F			F	B	C	F
Approach: Delay (s/veh)	132.05				209.47		57.61	
LOS	F				F		F	
Intersection Delay (s/veh)	128.02							
Intersection LOS	F							

Copyright © 2005 University of Florida, All Rights Reserved

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			418						7	2		217
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	130	385	0	0	0	239	0	6	2	108	200
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
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	14%	14%	14%	6%	6%	6%
Adj. Flow (vph)	0	141	418	0	0	0	260	0	7	2	117	217
Lane Group Flow (vph)	0	141	418	0	0	0	260	0	7	2	117	217
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	28.5	28.5	0.0	0.0	0.0	28.9	0.0	28.9	51.5	22.6	22.6
Total Split (%)	0.0%	35.6%	35.6%	0.0%	0.0%	0.0%	36.1%	0.0%	36.1%	64.4%	28.3%	28.3%
Maximum Green (s)		23.6	23.6				24.0		24.0	46.6	17.7	17.7
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		24.5	24.5				24.9		24.9	15.5	18.6	18.6
Actuated g/C Ratio		0.31	0.31				0.31		0.31	0.18	0.23	0.23
v/c Ratio		0.25	0.54				0.53		0.02	0.01	0.28	0.42
Control Delay		22.3	5.4				27.4		11.7	12.0	27.4	6.7
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		22.3	5.4				27.4		11.7	12.0	27.4	6.7
LOS		C	A				C		B	B	C	A
Approach Delay		9.6									13.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A									B	
Queue Length 50th (ft)		52	0				106		0	0	48	0
Queue Length 95th (ft)		97	62				179		9	3	93	52
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		565	770				493		446	695	417	521
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.25	0.54				0.53		0.02	0.00	0.28	0.42

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 14.9 Intersection LOS: B
Intersection Capacity Utilization 36.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps

2008 Project Alt A PM
21: Avenue 16 & SR 99 SB ramps

7/25/2006

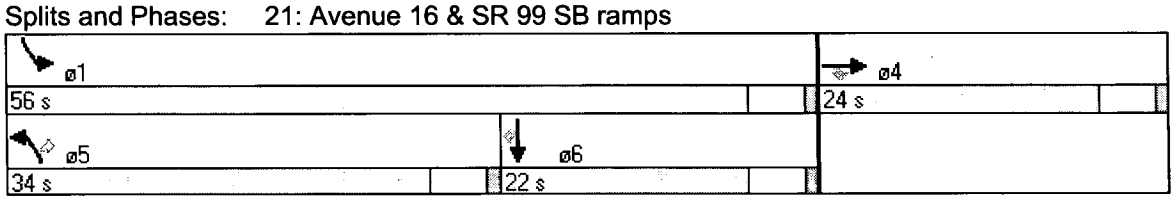
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			739						11	3		514
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	285	680	0	0	0	524	0	10	3	196	473
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	310	739	0	0	0	570	0	11	3	213	514
Lane Group Flow (vph)	0	310	739	0	0	0	570	0	11	3	213	514
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	24.0	24.0	0.0	0.0	0.0	34.0	0.0	34.0	56.0	22.0	22.0
Total Split (%)	0.0%	30.0%	30.0%	0.0%	0.0%	0.0%	42.5%	0.0%	42.5%	70.0%	27.5%	27.5%
Maximum Green (s)		19.1	19.1				29.1		29.1	51.1	17.1	17.1
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		20.0	20.0				30.0		30.0	16.5	18.0	18.0
Actuated g/C Ratio		0.25	0.25				0.38		0.38	0.19	0.22	0.22
v/c Ratio		0.67	0.78				0.86		0.02	0.01	0.52	0.69
Control Delay		35.0	9.0				38.2		8.8	10.3	32.5	8.2
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		35.0	9.0				38.2		8.8	10.3	32.5	8.2
LOS		D	A				D		A	B	C	A
Approach Delay		16.7									15.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B									B	
Queue Length 50th (ft)		139	0				257		0	0	94	0
Queue Length 95th (ft)		225	105				#442		10	3	161	83
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		466	950				664		601	759	411	748
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.67	0.78				0.86		0.02	0.00	0.52	0.69

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 65.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		151			6	133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	308	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	284					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	6	144	0	164	0
Percent Heavy Vehicles	3	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						308		
C (m) (veh/h)						744		
v/c						0.41		
95% queue length						2.04		
Control Delay (s/veh)						13.2		
LOS						B		
Approach Delay (s/veh)	--	--				13.2		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		222			10	299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	488	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	449					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	10	324	0	241	0
Percent Heavy Vehicles	2	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						488		
C (m) (veh/h)						595		
v/c						0.82		
95% queue length						8.40		
Control Delay (s/veh)						32.8		
LOS						D		
Approach Delay (s/veh)	--	--				32.8		
Approach LOS	--	--				D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: Avenue 16 connector | North/South Street: Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		112		284	209	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	144
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	308	227	0	0	121	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		308			144			
C (m) (veh/h)		1430			930			
v/c		0.22			0.15			
95% queue length		0.82			0.55			
Control Delay (s/veh)		8.2			9.6			
LOS		A			A			
Approach Delay (s/veh)	--	--	9.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description	04-837.1 Northfork Casino Alt A
East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235		449	427	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	324
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	488	464	0	0	255	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		488			324			
C (m) (veh/h)		1265			784			
v/c		0.39			0.41			
95% queue length		1.85			2.04			
Control Delay (s/veh)		9.6			12.8			
LOS		A			B			
Approach Delay (s/veh)	--	--	12.8					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		112	151		209	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	6	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				6		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	227	0	0	121	164
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			6					
C (m) (veh/h)			582					
v/c			0.01					
95% queue length			0.03					
Control Delay (s/veh)			11.2					
LOS			B					
Approach Delay (s/veh)	--	--	11.2					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt A

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235	222		427	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	464	0	0	255	241
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			10					
C (m) (veh/h)			335					
v/c			0.03					
95% queue length			0.09					
Control Delay (s/veh)			16.1					
LOS			C					
Approach Delay (s/veh)	--	--	16.1					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

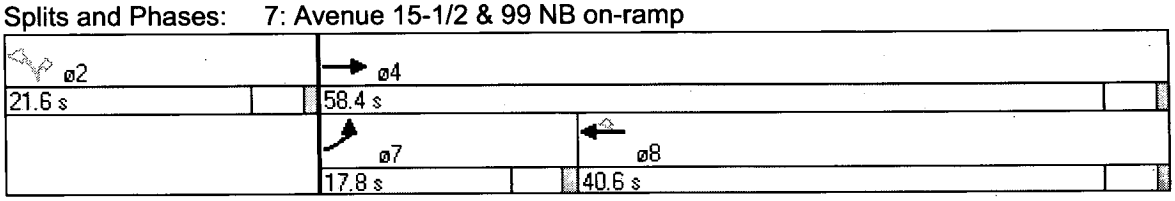
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						220			200			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	127	711	0	0	1025	202	344	0	184	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	138	773	0	0	1114	220	374	0	200	0	0	0
Lane Group Flow (vph)	138	773	0	0	1114	220	374	0	200	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	17.8	58.4	0.0	0.0	40.6	40.6	21.6	0.0	21.6	0.0	0.0	0.0
Total Split (%)	22.3%	73.0%	0.0%	0.0%	50.8%	50.8%	27.0%	0.0%	27.0%	0.0%	0.0%	0.0%
Maximum Green (s)	13.2	53.8			36.0	36.0	17.0		17.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	11.6	57.3			41.7	41.7	14.7		14.7			
Actuated g/C Ratio	0.14	0.72			0.52	0.52	0.18		0.18			
v/c Ratio	0.54	0.30			0.62	0.24	0.63		0.46			
Control Delay	51.5	0.4			16.5	2.7	34.7		8.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	51.5	0.4			16.5	2.7	34.7		8.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B	A	C		A			
Approach Delay		8.2			14.2							
Approach LOS		A			B							
Queue Length 50th (ft)	77	1			197	0	89		0			
Queue Length 95th (ft)	m120	2			296	36	127		51			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	306	2535			1808	914	713		485			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.45	0.30			0.62	0.24	0.52		0.41			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 61.3% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						301			26			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	242	1783	0	0	1679	356	699	0	311	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	263	1938	0	0	1825	387	760	0	338	0	0	0
Lane Group Flow (vph)	263	1938	0	0	1825	387	760	0	338	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	20.5	81.6	0.0	0.0	61.1	61.1	28.4	0.0	28.4	0.0	0.0	0.0
Total Split (%)	18.6%	74.2%	0.0%	0.0%	55.5%	55.5%	25.8%	0.0%	25.8%	0.0%	0.0%	0.0%
Maximum Green (s)	15.9	77.0			56.5	56.5	23.8		23.8			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	16.5	77.6			57.1	57.1	24.4		24.4			
Actuated g/C Ratio	0.15	0.71			0.52	0.52	0.22		0.22			
v/c Ratio	0.99	0.78			0.99	0.40	1.01		0.92			
Control Delay	75.5	2.1			46.4	4.9	77.9		69.9			
Queue Delay	0.0	2.6			1.2	0.0	0.0		0.0			
Total Delay	75.5	4.7			47.6	4.9	77.9		69.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			D	A	E		E			
Approach Delay		13.1			40.1							
Approach LOS		B			D							
Queue Length 50th (ft)	197	89			646	30	~281		219			
Queue Length 95th (ft)	m192	m84			#841	85	#409		#394			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	266	2497			1837	966	754		368			
Starvation Cap Reductn	0	423			0	0	0		0			
Spillback Cap Reductn	0	0			10	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.99	0.93			1.00	0.40	1.01		0.92			

Intersection Summary

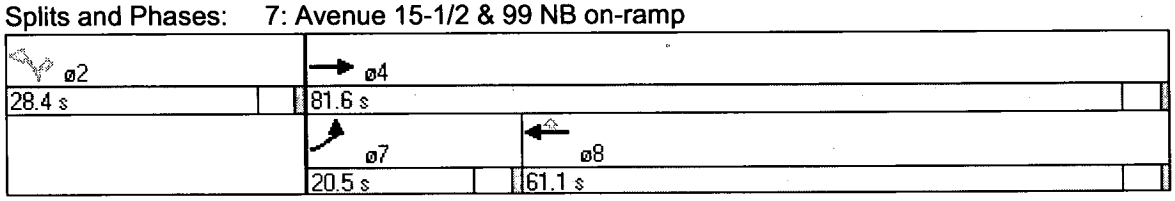
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 36.4 Intersection LOS: D
Intersection Capacity Utilization 133.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



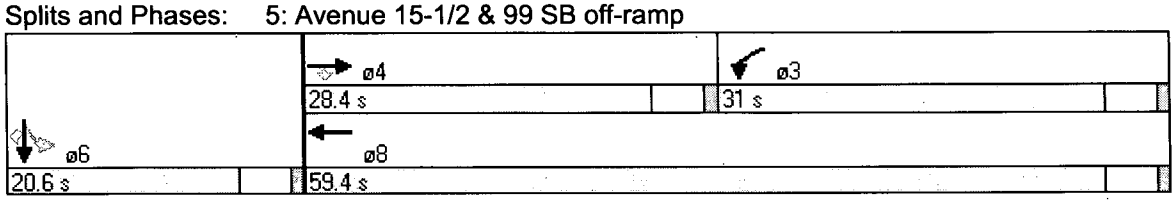
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			385									92
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	674	354	361	1008	0	0	0	0	169	1	85
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	733	385	392	1096	0	0	0	0	184	1	92
Lane Group Flow (vph)	0	733	385	392	1096	0	0	0	0	0	185	92
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	28.4	28.4	31.0	59.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	35.5%	35.5%	38.8%	74.3%	0.0%	0.0%	0.0%	0.0%	25.8%	25.8%	25.8%
Maximum Green (s)		23.8	23.8	26.4	54.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		27.6	27.6	27.0	58.6						13.4	13.4
Actuated g/C Ratio		0.34	0.34	0.34	0.73						0.17	0.17
v/c Ratio		0.60	0.48	0.67	0.43						0.62	0.27
Control Delay		24.9	4.8	21.4	0.8						39.8	8.6
Queue Delay		0.0	0.0	0.0	0.2						0.0	0.0
Total Delay		24.9	4.8	21.4	0.9						39.8	8.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A						D	A
Approach Delay		18.0			6.3						29.5	
Approach LOS		B			A						C	
Queue Length 50th (ft)		158	0	156	2						86	0
Queue Length 95th (ft)		228	60	237	10						145	36
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1219	798	586	2541						368	401
Starvation Cap Reductn		0	0	0	513						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.60	0.48	0.67	0.54						0.50	0.23

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 5 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 61.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.952	
Satd. Flow (prot)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Flt Permitted				0.950							0.952	
Satd. Flow (perm)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			474									12
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1601	575	296	2082	0	0	0	0	410	1	203
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1740	625	322	2263	0	0	0	0	446	1	221
Lane Group Flow (vph)	0	1740	625	322	2263	0	0	0	0	0	447	221
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	57.0	57.0	23.0	80.0	0.0	0.0	0.0	0.0	30.0	30.0	30.0
Total Split (%)	0.0%	51.8%	51.8%	20.9%	72.7%	0.0%	0.0%	0.0%	0.0%	27.3%	27.3%	27.3%
Maximum Green (s)		52.4	52.4	18.4	75.4					25.4	25.4	25.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		53.0	53.0	19.0	76.0						26.0	26.0
Actuated g/C Ratio		0.48	0.48	0.17	0.69						0.24	0.24
v/c Ratio		1.02	0.62	1.05	0.93						1.07	0.58
Control Delay		56.1	7.7	79.1	11.8						103.9	42.0
Queue Delay		0.0	0.0	0.0	10.6						0.0	0.0
Total Delay		56.1	7.7	79.1	22.5						103.9	42.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A	E	C						F	D
Approach Delay		43.3			29.5						83.4	
Approach LOS		D			C						F	
Queue Length 50th (ft)		~687	59	~246	275						~350	131
Queue Length 95th (ft)		#827	170	m#248	m280						#547	213
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1705	1008	306	2445						419	383
Starvation Cap Reductn		0	0	0	206						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		1.02	0.62	1.05	1.01						1.07	0.58

Intersection Summary

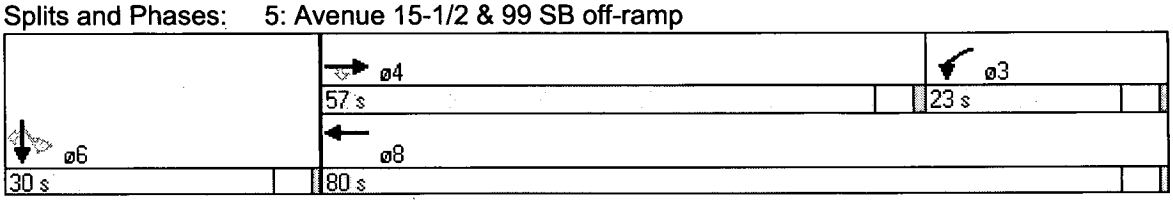
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 98 (89%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 41.7 Intersection LOS: D
Intersection Capacity Utilization 133.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
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
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.901	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1678	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1678	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46					188	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	377	0	42	392	503	0	0	165	446
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	410	0	46	426	547	0	0	179	485
Lane Group Flow (vph)	0	0	0	410	0	46	426	547	0	0	664	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	23.5	0.0	23.5	24.3	56.5	0.0	0.0	32.2	0.0
Total Split (%)	0.0%	0.0%	0.0%	29.4%	0.0%	29.4%	30.4%	70.6%	0.0%	0.0%	40.3%	0.0%
Maximum Green (s)				18.9		18.9	19.7	51.9			27.6	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				19.7		19.7	20.5	52.3			27.8	
Actuated g/C Ratio				0.25		0.25	0.26	0.65			0.35	
v/c Ratio				0.94		0.11	0.94	0.45			0.94	
Control Delay				62.7		8.5	54.3	9.6			42.2	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				62.7		8.5	54.3	9.6			42.2	
LOS				E		A	D	A			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								29.2			42.2	
Approach LOS								C			D	
Queue Length 50th (ft)				202		0	224	187			238	
Queue Length 95th (ft)				#374		25	#394	239			#461	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				436		425	453	1223			713	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.94		0.11	0.94	0.45			0.93	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 8 (10%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 39.4 Intersection LOS: D
Intersection Capacity Utilization 88.7% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave

2008 Project PM Alt A
6: 99 NB on-ramp & SR 145 / Madera Ave 7/25/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
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
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.916	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1706	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1706	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41					97	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	250	0	38	612	686	0	0	265	442
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	272	0	41	665	746	0	0	288	480
Lane Group Flow (vph)	0	0	0	272	0	41	665	746	0	0	768	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	37.0	79.4	0.0	0.0	42.4	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.6%	0.0%	20.6%	37.0%	79.4%	0.0%	0.0%	42.4%	0.0%
Maximum Green (s)				16.0		16.0	32.4	74.8			37.8	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				16.6		16.6	33.0	75.4			38.4	
Actuated g/C Ratio				0.17		0.17	0.33	0.75			0.38	
v/c Ratio				0.93		0.14	1.14	0.53			1.07	
Control Delay				79.0		12.5	103.0	7.4			83.0	
Queue Delay				0.0		0.0	0.0	1.4			0.0	
Total Delay				79.0		12.5	103.0	8.8			83.0	
LOS				E		B	F	A			F	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								53.2			83.0	
Approach LOS								D			F	
Queue Length 50th (ft)				173		0	~504	219			~508	
Queue Length 95th (ft)				#327		30	m#544	m238			#739	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				294		297	584	1405			715	
Starvation Cap Reductn				0		0	0	438			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.93		0.14	1.14	0.77			1.07	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 64.5 Intersection LOS: E
Intersection Capacity Utilization 98.8% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave

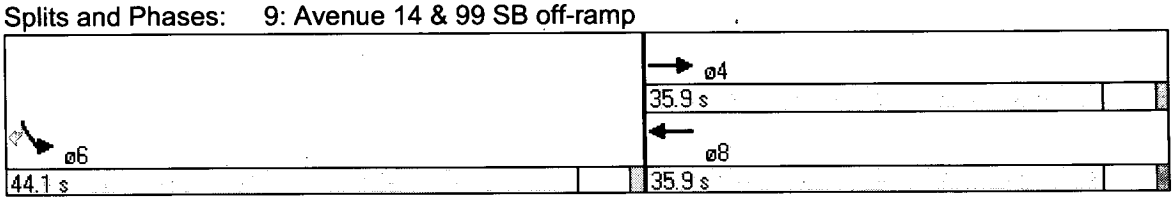
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						248
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	435	417	0	495	301
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	473	453	0	538	327
Lane Group Flow (vph)	0	473	453	0	538	327
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	35.9	35.9	0.0	44.1	44.1
Total Split (%)	0.0%	44.9%	44.9%	0.0%	55.1%	55.1%
Maximum Green (s)		31.3	31.3		39.5	39.5
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		42.3	42.3		29.7	29.7
Actuated g/C Ratio		0.53	0.53		0.37	0.37
v/c Ratio		0.25	0.46		0.83	0.44
Control Delay		12.3	4.1		33.3	5.9
Queue Delay		0.1	0.5		0.4	0.0
Total Delay		12.4	4.6		33.7	5.9
LOS		B	A		C	A
Approach Delay		12.4	4.6		23.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		C	
Queue Length 50th (ft)		63	13		237	25
Queue Length 95th (ft)		120	64		285	62
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1870	985		878	910
Starvation Cap Reductn		0	213		0	0
Spillback Cap Reductn		570	0		71	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.36	0.59		0.67	0.36

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 15.6 Intersection LOS: B
Intersection Capacity Utilization 56.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						204
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	563	314	0	660	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	612	341	0	717	204
Lane Group Flow (vph)	0	612	341	0	717	204
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	35.9	35.9	0.0	64.1	64.1
Total Split (%)	0.0%	35.9%	35.9%	0.0%	64.1%	64.1%
Maximum Green (s)		31.3	31.3		59.5	59.5
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		47.4	47.4		44.6	44.6
Actuated g/C Ratio		0.47	0.47		0.45	0.45
v/c Ratio		0.36	0.39		0.91	0.25
Control Delay		19.5	19.8		41.0	2.4
Queue Delay		0.0	5.3		13.5	0.0
Total Delay		19.5	25.1		54.5	2.4
LOS		B	C		D	A
Approach Delay		19.5	25.1		43.0	
Approach LOS		B	C		D	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		127	129		409	0
Queue Length 95th (ft)		212	200		455	30
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1677	883		1064	1033
Starvation Cap Reductn		0	469		0	0
Spillback Cap Reductn		95	0		334	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.39	0.82		0.98	0.20

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 32.1 Intersection LOS: C
Intersection Capacity Utilization 59.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp

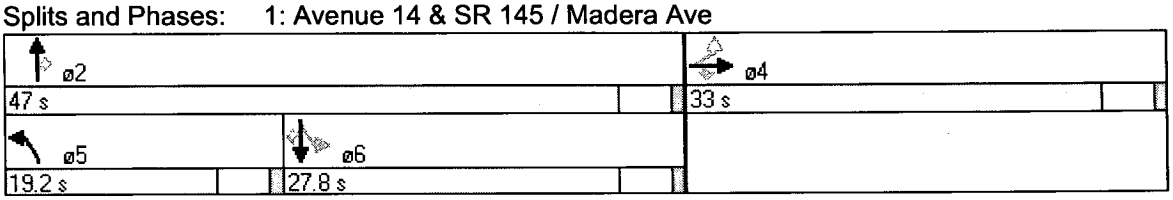
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.966					0.950				0.998	
Satd. Flow (prot)	0	1748	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted		0.966					0.950				0.924	
Satd. Flow (perm)	0	1748	1538	0	0	0	1752	1845	1568	0	3238	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			595						21			285
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	269	114	547	0	0	0	155	627	19	11	269	262
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	292	124	595	0	0	0	168	682	21	12	292	285
Lane Group Flow (vph)	0	416	595	0	0	0	168	682	21	0	304	285
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	33.0	33.0	33.0	0.0	0.0	0.0	19.2	47.0	47.0	27.8	27.8	27.8
Total Split (%)	41.3%	41.3%	41.3%	0.0%	0.0%	0.0%	24.0%	58.8%	58.8%	34.8%	34.8%	34.8%
Maximum Green (s)	28.4	28.4	28.4				14.6	42.4	42.4	23.2	23.2	23.2
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		27.6	27.6				12.7	44.4	44.4		27.7	27.7
Actuated g/C Ratio		0.34	0.34				0.16	0.56	0.56		0.35	0.35
v/c Ratio		0.69	0.65				0.60	0.67	0.02		0.27	0.39
Control Delay		26.4	7.4				40.4	17.5	4.2		8.9	2.2
Queue Delay		86.6	1.7				0.6	0.0	0.0		0.0	0.0
Total Delay		113.0	9.1				41.0	17.5	4.2		8.9	2.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				D	B	A		A	A
Approach Delay		51.8						21.7			5.6	
Approach LOS		D						C			A	
Queue Length 50th (ft)		123	0				78	244	0		24	0
Queue Length 95th (ft)		m236	m108				136	357	10		m47	m17
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		656	949				333	1047	899		1150	741
Starvation Cap Reductn		302	198				0	0	0		0	0
Spillback Cap Reductn		0	0				33	0	0		0	5
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.18	0.79				0.56	0.65	0.02		0.26	0.39

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 56 (70%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 30.2 Intersection LOS: C
Intersection Capacity Utilization 71.6% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave



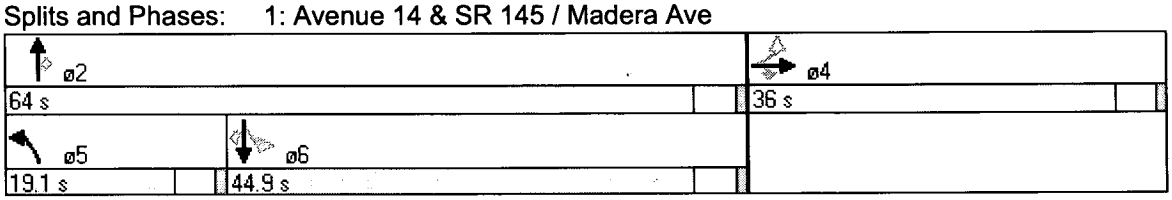
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.969					0.950				0.997	
Satd. Flow (prot)	0	1770	1553	0	0	0	1770	1863	1583	0	3529	1583
Flt Permitted		0.969					0.950				0.726	
Satd. Flow (perm)	0	1770	1553	0	0	0	1770	1863	1583	0	2569	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			579						16			208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	318	187	718	0	0	0	123	980	16	19	296	191
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	346	203	780	0	0	0	134	1065	17	21	322	208
Lane Group Flow (vph)	0	549	780	0	0	0	134	1065	17	0	343	208
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	36.0	36.0	36.0	0.0	0.0	0.0	19.1	64.0	64.0	44.9	44.9	44.9
Total Split (%)	36.0%	36.0%	36.0%	0.0%	0.0%	0.0%	19.1%	64.0%	64.0%	44.9%	44.9%	44.9%
Maximum Green (s)	31.4	31.4	31.4				14.5	59.4	59.4	40.3	40.3	40.3
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		32.2	32.2				12.6	59.8	59.8		43.2	43.2
Actuated g/C Ratio		0.32	0.32				0.13	0.60	0.60		0.43	0.43
v/c Ratio		0.96	0.87				0.60	0.96	0.02		0.31	0.26
Control Delay		54.6	19.2				52.3	38.5	3.9		3.9	0.6
Queue Delay		212.1	5.3				0.0	0.0	0.0		0.0	0.6
Total Delay		266.6	24.5				52.3	38.5	3.9		3.9	1.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	C				D	D	A		A	A
Approach Delay		124.5						39.5			2.9	
Approach LOS		F						D			A	
Queue Length 50th (ft)		367	140				81	588	0		22	3
Queue Length 95th (ft)		m#472	m#227				140	#919	9		m27	m4
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		570	893				267	1118	956		1109	801
Starvation Cap Reductn		202	74				0	0	0		0	0
Spillback Cap Reductn		0	0				0	0	0		0	313
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.49	0.95				0.50	0.95	0.02		0.31	0.43

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 36 (36%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 69.5 Intersection LOS: E
Intersection Capacity Utilization 97.8% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	171			148	239
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	37	194	0	0	168	271
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				201		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	228	0	25
Percent Heavy Vehicles	0	0	0	25	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	37						253	
C (m) (veh/h)	958						444	
v/c	0.04						0.57	
95% queue length	0.12						3.47	
Control Delay (s/veh)	8.9						23.3	
LOS	A						C	
Approach Delay (s/veh)	–	–				23.3		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved HCS+™ Version 5.2 Generated: 9/8/2006 8:59 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	13	228			209	261
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	14	259	0	0	237	296
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				212		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	240	0	25
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	14						265	
C (m) (veh/h)	891						421	
v/c	0.02						0.63	
95% queue length	0.05						4.19	
Control Delay (s/veh)	9.1						27.0	
LOS	A						D	
Approach Delay (s/veh)	–	–				27.0		
Approach LOS	–	–				D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Ave 18 1/2 @ Golden State*
Agency/Co.	*TPG Consulting*	Jurisdiction	*County of Madera*
Date Performed	*9/7/2006*	Analysis Year	*2008*
Analysis Time Period	*2008 Project AM*		

Project Description *04-837.1 Alternative A*

East/West Street: *Avenue 18 1/2* | North/South Street: *Golden State Blvd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	65			68	96
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	2	73	0	0	77	109
Percent Heavy Vehicles	8	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				98		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	111	0	2
Percent Heavy Vehicles	0	0	0	79	0	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	2						113	
C (m) (veh/h)	1353						688	
v/c	0.00						0.16	
95% queue length	0.00						0.58	
Control Delay (s/veh)	7.7						11.3	
LOS	A						B	
Approach Delay (s/veh)	--	--				11.3		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/26/2006 11:11 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	122			139	99
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	138	0	0	157	112
Percent Heavy Vehicles	5	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				107		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	121	0	2
Percent Heavy Vehicles	0	0	0	48	0	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	5						123	
C (m) (veh/h)	1277						601	
v/c	0.00						0.20	
95% queue length	0.01						0.76	
Control Delay (s/veh)	7.8						12.5	
LOS	A						B	
Approach Delay (s/veh)	–	–				12.5		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 10

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR 99-NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

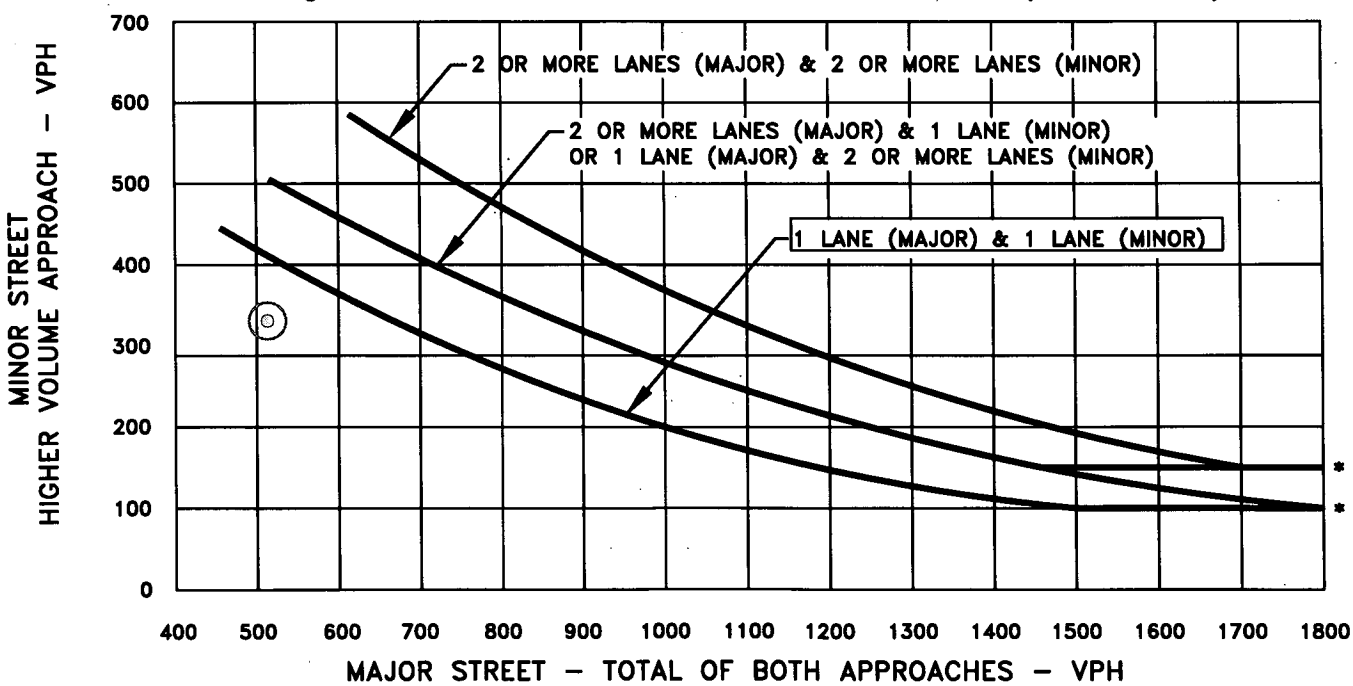
CONDITION: 2008 PROJECT ALT A

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		381	513			
Highest Approaches – Minor Street	✓		264	331			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☒ or ☐ RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐ URBAN (U)

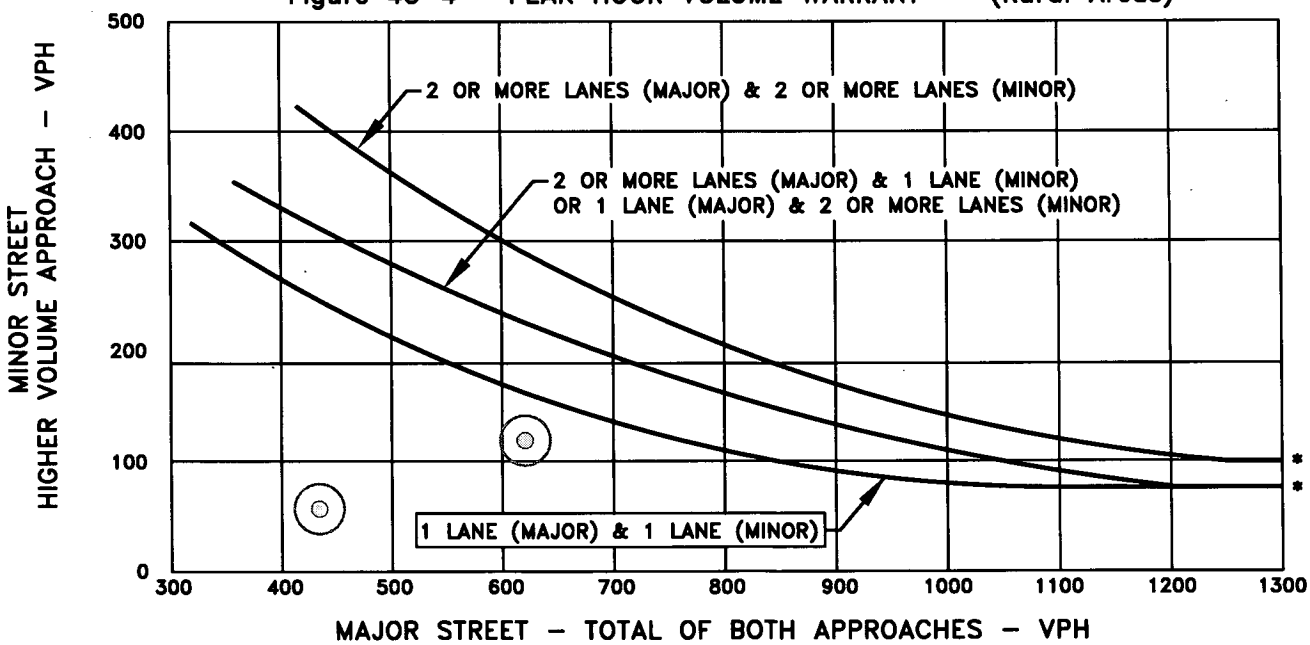
CONDITION: 2008 PROJECT ALT A

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		434	621				
Highest Approaches – Minor Street	✓		57	119				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 15 1/2 Critical Approach Speed NPS mph

MINOR STREET: ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

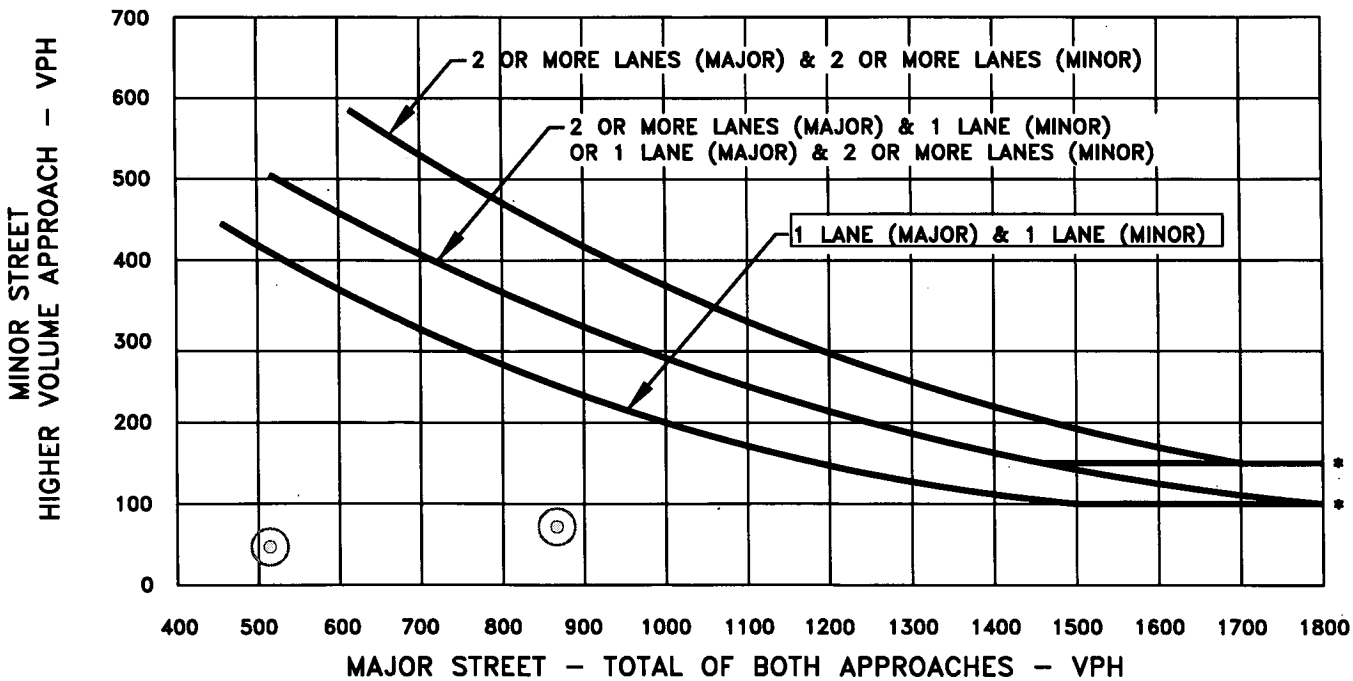
CONDITION: 2008 PROJECT ALT A

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		514	866			
Highest Approaches – Minor Street	✓		47	72			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 NB ON RAMP Critical Approach Speed NPS mph

MINOR STREET: GATEWAY/AVENUE 16 Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

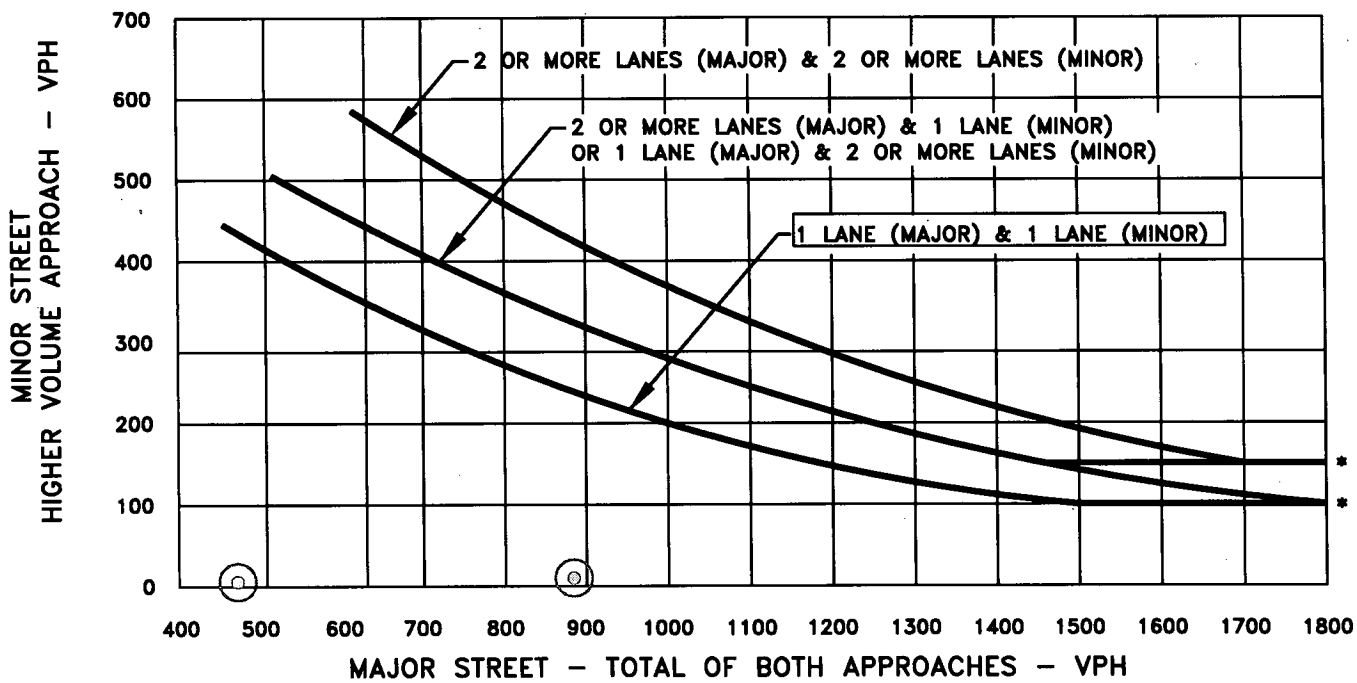
CONDITION: 2008 PROJECT ALT A

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		472	884			
Highest Approaches – Minor Street	✓		6	10			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: PISTACHIO DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

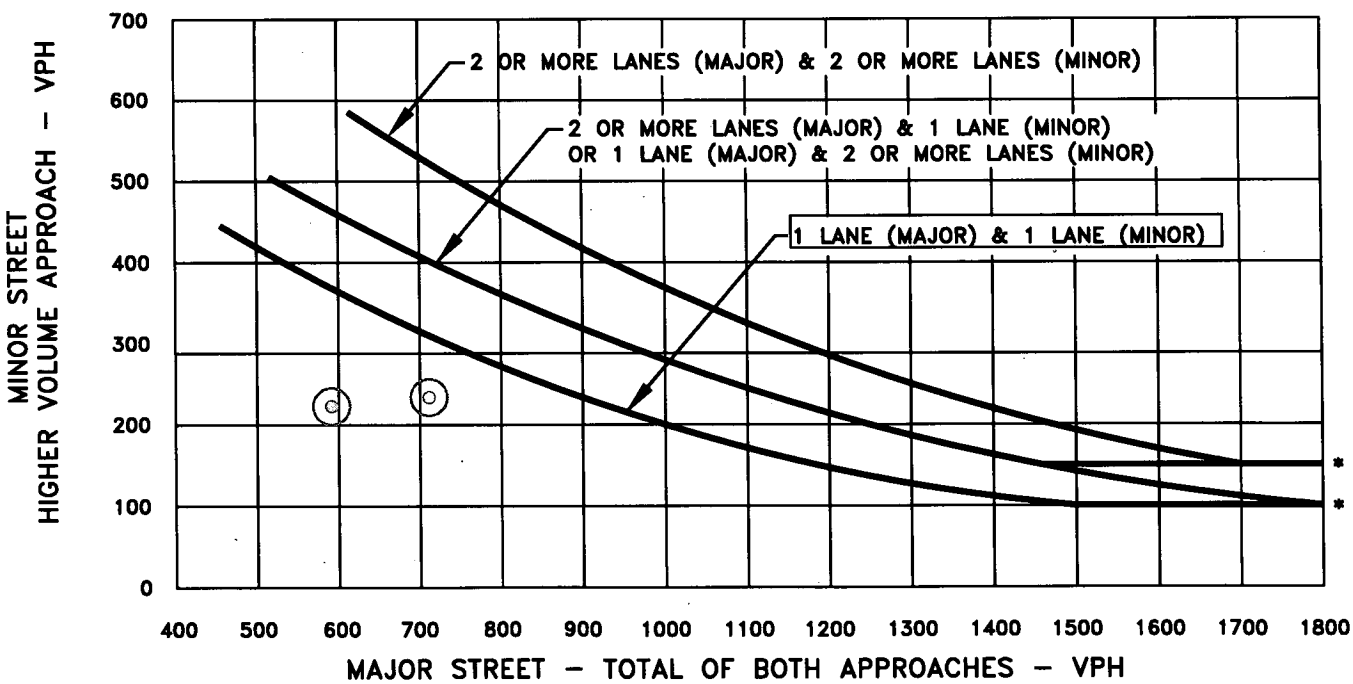
CONDITION: 2008 PROJECT ALTERNATIVE A

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		591	711			
Highest Approaches – Minor Street	✓		223	234			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: GOLDEN STATE BLVD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

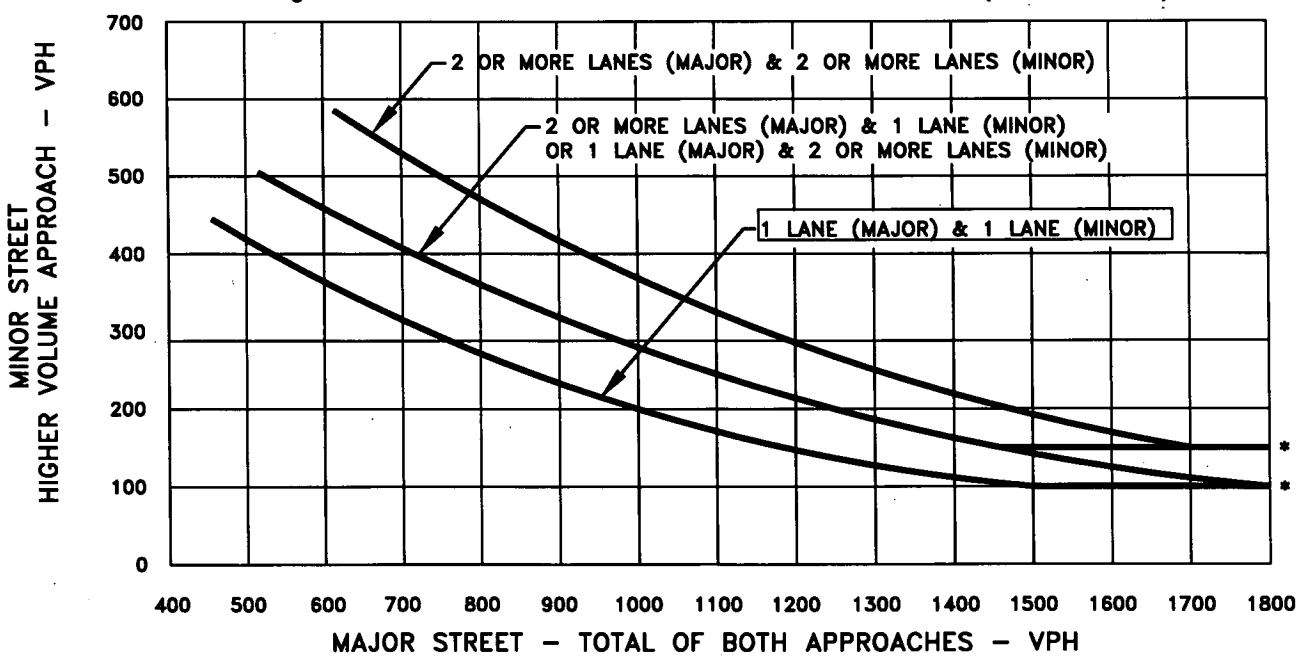
CONDITION: 2008 PROJECT ALTERNATIVE A

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		231	365			
Highest Approaches – Minor Street	✓		100	109			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

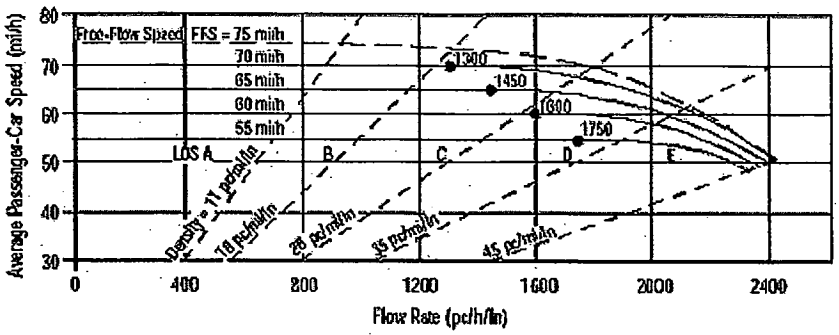
ATTACHMENT VI – C - 11

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2742*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

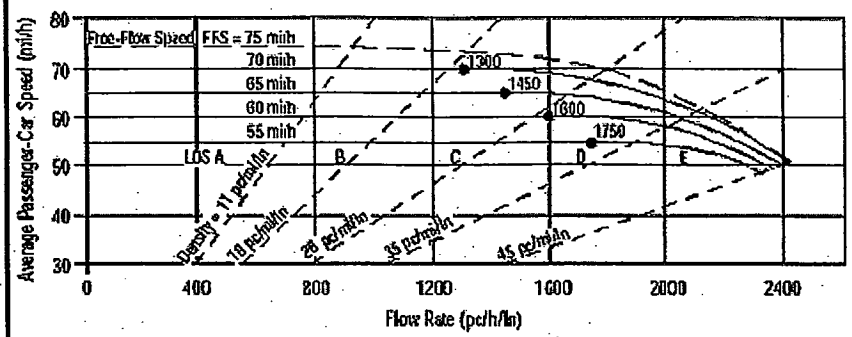
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1675*	pc/h/ln	Design LOS	
S	*69.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*24.3*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt b

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2910*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

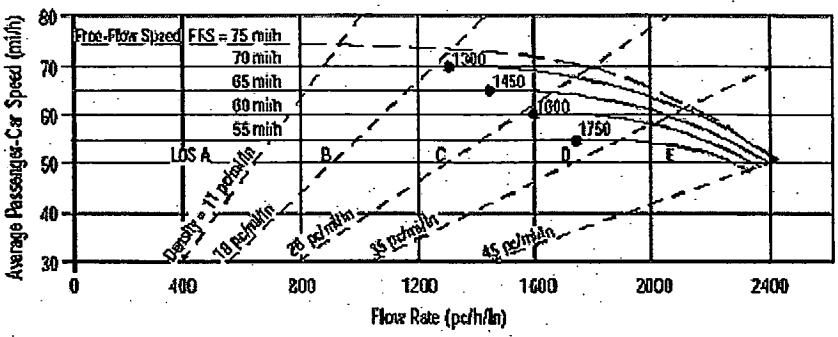
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1778*	pc/h/ln	Design LOS		
S	*68.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*26.1*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2311*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1412*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*20.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

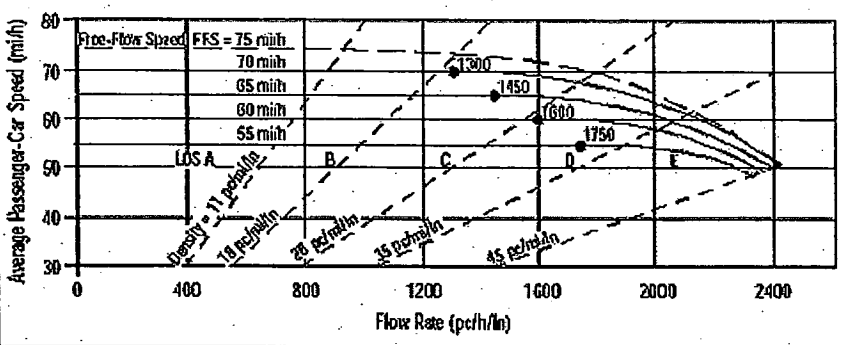
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3485*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

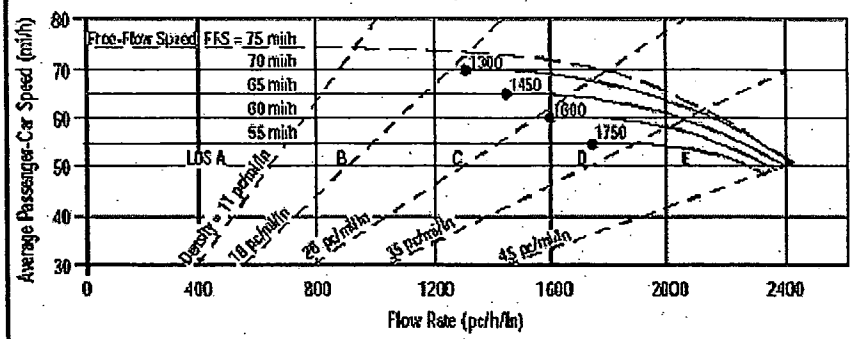
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2129*	pc/h/ln	Design LOS		
S	*62.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*34.3*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2975*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1817*	pc/h/ln
S	*67.7*	mi/h
D = v_p / S	*26.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

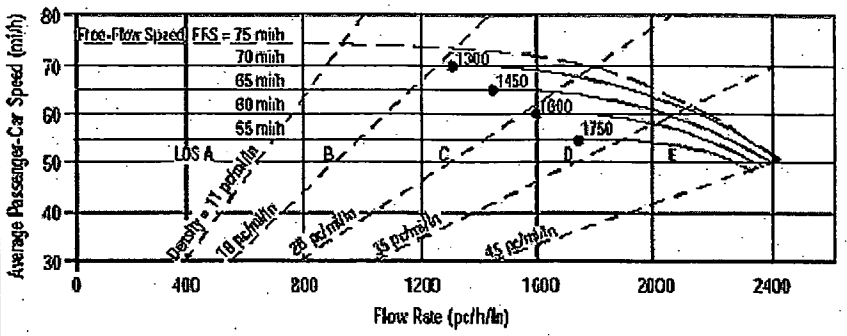
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*3083*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1883*	pc/h/ln
S	*66.8*	mi/h
D = v_p / S	*28.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

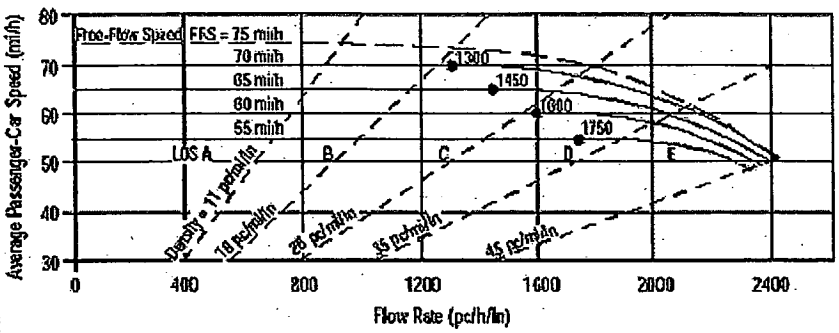
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1505*	pc/h/ln
S	*69.8*	mi/h
D = v_p / S	*21.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

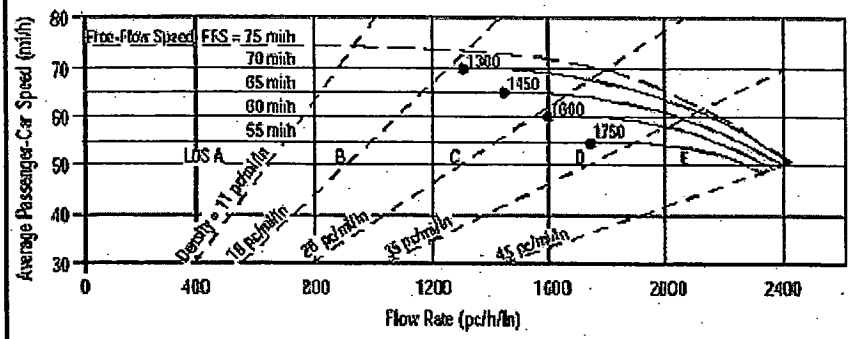
N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*3715*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2269*	pc/h/ln
S	*58.0*	mi/h
D = v_p / S	*39.1*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

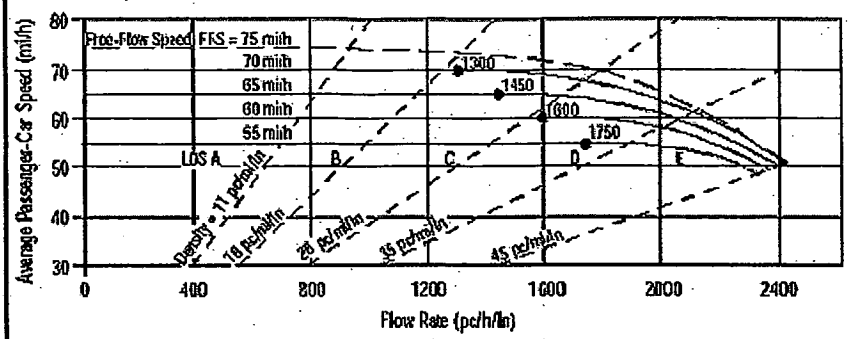
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*3477*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

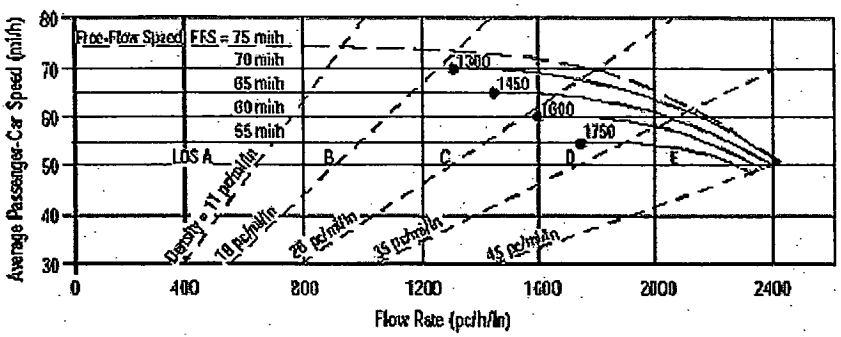
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2124*	pc/h/ln	Design LOS		
S	*62.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*34.2*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*4766*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) *2911*		pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

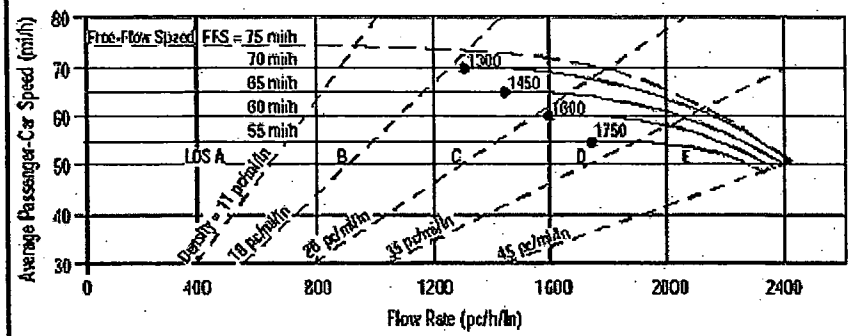
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2692*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1644*	pc/h/ln
S	*69.2*	mi/h
D = v_p / S	*23.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

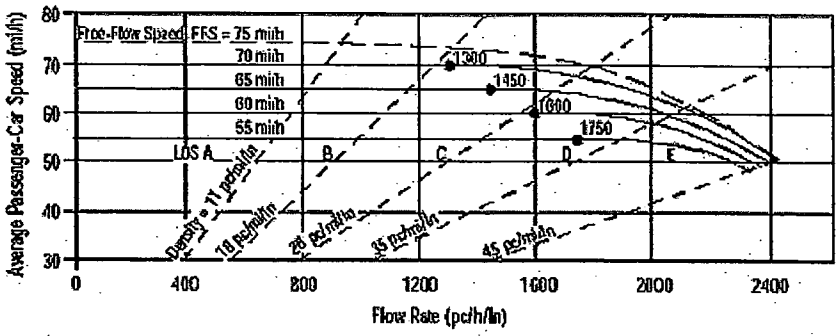
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*4766*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2911*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

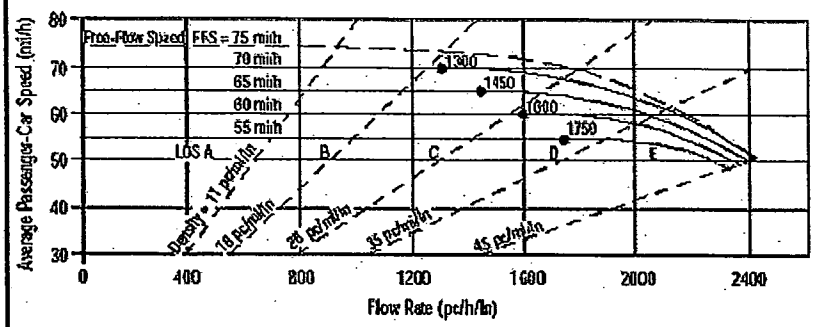
ATTACHMENT VI – C - 12

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

INTERSECTION LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

Oper.(LOS) | Des.(N) | Planning Data

Flow Inputs

Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1505*	pc/h/ln
S	*69.8*	mi/h
D = v_p / S	*21.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

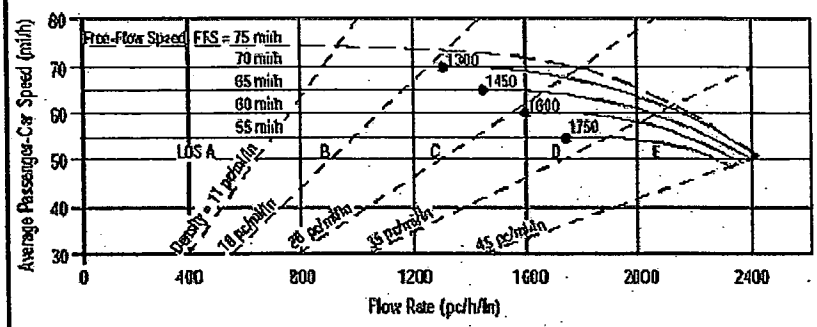
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	S. Leon	Highway/Direction of Travel	SR 99 Southbound
Agency or Company	TPG Consulting, Inc.	From/To	between Ave 18 1/2 & Ave 17
Date Performed	7/19/06	Jurisdiction	Caltrans
Analysis Time Period	2008 Project PM	Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

■ Oper.(LOS) ■ Des.(N) ■ Planning Data

Flow Inputs

Volume, V	3715	veh/h	Peak-Hour Factor, PHF	0.92
AADT		veh/day	%Trucks and Buses, P_T	24
Peak-Hr Prop. of AADT, K			%RVs, P_R	2
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.890

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	70.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2269	pc/h/ln
S	58.0	mi/h
D = v_p / S	39.1	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

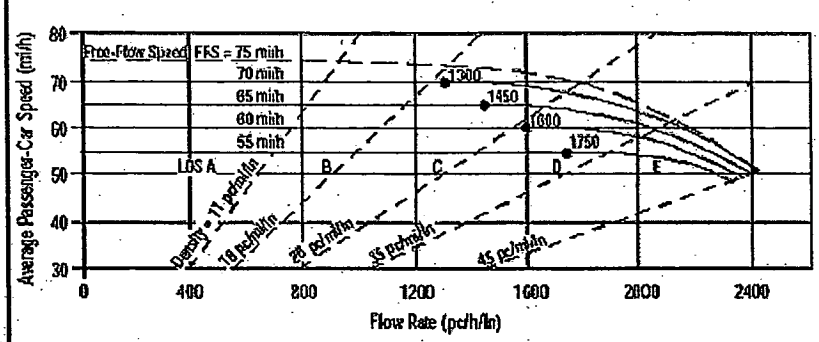
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

Oper.(LOS) | Des.(N) | Planning Data

Flow Inputs

Volume, V	*3477*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2124*	pc/h/ln
S	*62.1*	mi/h
D = v_p / S	*34.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

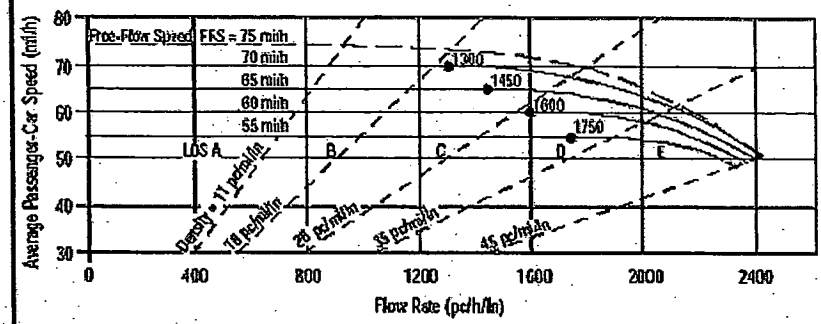
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

Oper.(LOS) | Des.(N) | Planning Data

Flow Inputs

Volume, V	*4766*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

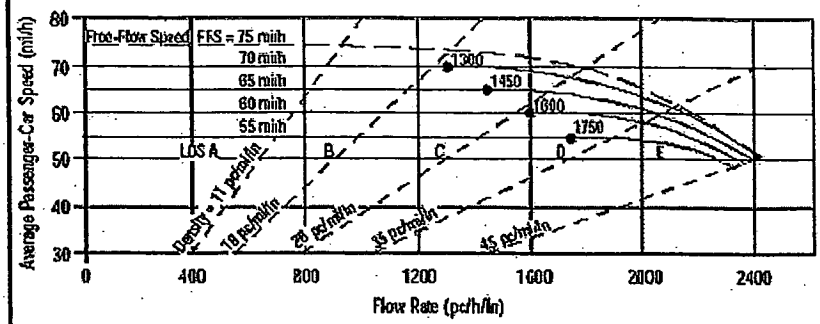
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2911*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

Oper.(LOS) | Des.(N) | Planning Data

Flow Inputs

Volume, V	*2692*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1644*	pc/h/ln
S	*69.2*	mi/h
D = v_p / S	*23.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

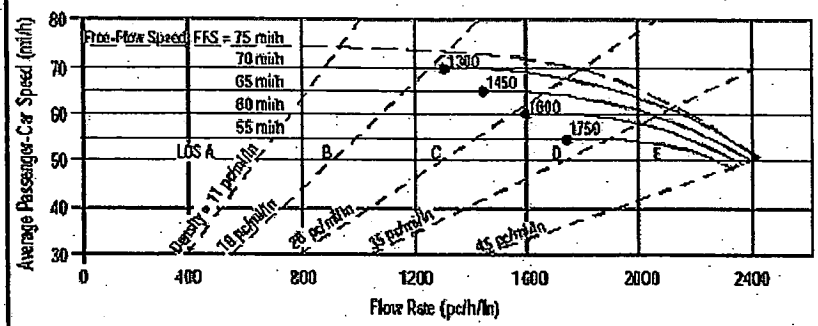
N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

Oper.(LOS) | Des.(N) | Planning Data

Flow Inputs

Volume, V	*4766*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2911*	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18-1/2 | North/South Street: 99 SB offramp / Road 23

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		355	68	34	256	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	403	77	38	290	0
Percent Heavy Vehicles	0	–	–	29	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	64		125	12	126	66
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	72	0	142	13	143	75
Percent Heavy Vehicles	20	0	20	37	37	37
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		38	72		142		231	
C (m) (veh/h)		956	111		579		305	
v/c		0.04	0.65		0.25		0.76	
95% queue length		0.12	3.30		0.96		5.77	
Control Delay (s/veh)		8.9	83.7		13.2		45.9	
LOS		A	F		B		E	
Approach Delay (s/veh)	–	–	37.0			45.9		
Approach LOS	–	–	E			E		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/29/2006 5:35 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18-1/2 | North/South Street: 99 SB offramp / Road 23

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		372	73	48	288	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	422	82	54	327	0
Percent Heavy Vehicles	0	–	–	22	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	61		208	36	177	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	69	0	236	40	201	144
Percent Heavy Vehicles	20	0	20	45	45	45
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		54	69		236		385	
C (m) (veh/h)		965	16		563		241	
v/c		0.06	4.31		0.42		1.60	
95% queue length		0.18	9.38		2.06		24.01	
Control Delay (s/veh)		9.0	1971		15.9		324.1	
LOS		A	F		C		F	
Approach Delay (s/veh)	–	–	458.3			324.1		
Approach LOS	–	–	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	193	56			96	24
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	219	63	0	0	109	27
Percent Heavy Vehicles	48	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	242	0	22			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	275	0	25	0	0	0
Percent Heavy Vehicles	35	35	35	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	219			300				
C (m) (veh/h)	1209			347				
v/c	0.18			0.86				
95% queue length	0.66			8.07				
Control Delay (s/veh)	8.6			55.4				
LOS	A			F				
Approach Delay (s/veh)	–	–	55.4					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 8/29/2006 5:26 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18-1/2 | North/South Street: SR 99 NB ramps

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	262	93			127	10
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	297	105	0	0	144	11
Percent Heavy Vehicles	19	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	285	0	46			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	323	0	52	0	0	0
Percent Heavy Vehicles	20	20	20	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	297			375				
C (m) (veh/h)	1328			267				
v/c	0.22			1.40				
95% queue length	0.86			20.40				
Control Delay (s/veh)	8.5			239.1				
LOS	A			F				
Approach Delay (s/veh)	–	–	239.1					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/29/2006 5:34 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 17 | North/South Street: SR 99 SB ramps

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		680			970	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	772	0	0	1102	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				135		62
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	153	0	70
Percent Heavy Vehicles	0	0	0	6	0	6
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						153		70
C (m) (veh/h)						77		253
v/c						1.99		0.28
95% queue length						13.69		1.10
Control Delay (s/veh)						575.7		24.6
LOS						F		C
Approach Delay (s/veh)	--	--				402.7		
Approach LOS	--	--				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*S. Leon*	Intersection	*Ave 17 @ 99 SB ramps*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Caltrans*
Date Performed	*7/17/06*	Analysis Year	*2008*
Analysis Time Period	*2008 Project PM*		

Project Description *04-837.1 Northfork Casino Alt B*	
East/West Street: *Avenue 17*	North/South Street: *SR 99 SB ramps*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1640*			*1501*	
Peak-Hour Factor, PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*0*	*1863*	*0*	*0*	*1705*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*282*		*74*
Peak-Hour Factor, PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*320*	*0*	*84*
Percent Heavy Vehicles	*0*	*0*	*0*	*8*	*0*	*8*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						*L*		*R*
v (veh/h)						*320*		*84*
C (m) (veh/h)						*6*		*109*
v/c						*53.33*		*0.77*
95% queue length						*42.10*		*4.26*
Control Delay (s/veh)						*24751*		*105.2*
LOS						*F*		*F*
Approach Delay (s/veh)	--	--				*19627*		
Approach LOS	--	--				*F*		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/26/2006 11:14 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt B
East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	42	288			791	64
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	47	327	0	0	898	72
Percent Heavy Vehicles	3	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	629	36	271			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	714	40	307	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	47		754		307			
C (m) (veh/h)	706		153		714			
v/c	0.07		4.93		0.43			
95% queue length	0.21		78.72		2.17			
Control Delay (s/veh)	10.5		1825		13.8			
LOS	B		F		B			
Approach Delay (s/veh)	--	--	1301					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	57	837			1298	194
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	64	951	0	0	1475	220
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	875	0	1011			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	994	0	1148	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	64		994		1148			
C (m) (veh/h)	376		21		315			
v/c	0.17		47.33		3.64			
95% queue length	0.61		124.62		108.11			
Control Delay (s/veh)	16.5		21200		1222			
LOS	C		F		F			
Approach Delay (s/veh)	--	--	10493					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		89	125	209	25	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	69	0	243
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				61		214
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	237	28	0	0	101	142
Percent Heavy Vehicles	0	0	0	11	0	11
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		237		312				
C (m) (veh/h)		1289		631				
v/c		0.18		0.49				
95% queue length		0.67		2.75				
Control Delay (s/veh)		8.4		16.2				
LOS		A		C				
Approach Delay (s/veh)	--	--	16.2					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		143	152	246	35	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	188	0	710
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				166		625
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	279	39	0	0	162	172
Percent Heavy Vehicles	0	0	0	5	0	5
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		279		898				
C (m) (veh/h)		1182		542				
v/c		0.24		1.66				
95% queue length		0.92		51.09				
Control Delay (s/veh)		9.0		323.1				
LOS		A		F				
Approach Delay (s/veh)	--	--	323.1					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

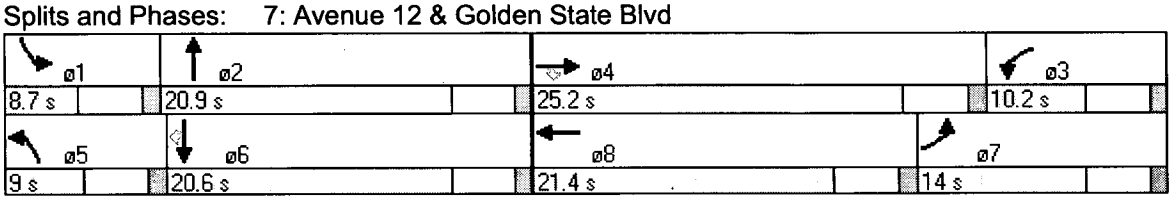
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.986			0.852				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		8			313				24
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	180	249	24	83	292	29	70	5	288	59	5	22
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	196	271	26	90	317	32	76	5	313	64	5	24
Lane Group Flow (vph)	196	271	26	90	349	0	76	318	0	64	5	24
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	14.0	25.2	25.2	10.2	21.4	0.0	9.0	20.9	0.0	8.7	20.6	20.6
Total Split (%)	21.5%	38.8%	38.8%	15.7%	32.9%	0.0%	13.8%	32.2%	0.0%	13.4%	31.7%	31.7%
Maximum Green (s)	9.4	20.6	20.6	5.6	16.8		4.4	16.3		4.1	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	9.9	33.0	33.0	6.2	27.3		5.1	10.6		4.8	8.6	8.6
Actuated g/C Ratio	0.15	0.51	0.51	0.10	0.42		0.08	0.16		0.07	0.13	0.13
v/c Ratio	0.79	0.31	0.03	0.56	0.47		0.60	0.64		0.50	0.02	0.11
Control Delay	51.2	13.5	6.0	37.4	15.2		51.4	9.9		44.5	21.8	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	51.2	13.5	6.0	37.4	15.2		51.4	9.9		44.5	21.8	10.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	B	A	D	B		D	A		D	C	B
Approach Delay		28.1			19.8			17.9			34.6	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	76	61	0	37	74		30	2		25	2	0
Queue Length 95th (ft)	#173	143	14	m54	m187		#87	58		#71	9	16
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	252	877	759	162	747		127	607		127	462	411
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.78	0.31	0.03	0.56	0.47		0.60	0.52		0.50	0.01	0.06

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 23.1 Intersection LOS: C
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



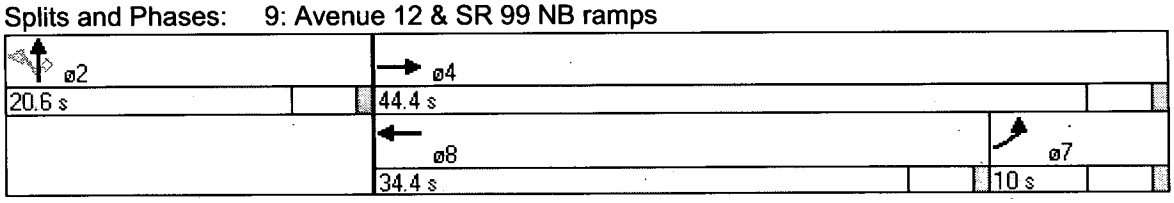
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.920				0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1681	0	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1681	0	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					154				89			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	104	492	0	0	249	368	155	4	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	118	559	0	0	283	418	176	5	89	0	0	0
Lane Group Flow (vph)	118	559	0	0	701	0	0	181	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	10.0	44.4	0.0	0.0	34.4	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	15.4%	68.3%	0.0%	0.0%	52.9%	0.0%	31.7%	31.7%	31.7%	0.0%	0.0%	0.0%
Maximum Green (s)	5.4	39.8			29.8		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	6.0	44.4			36.4			12.6	12.6			
Actuated g/C Ratio	0.09	0.68			0.56			0.19	0.19			
v/c Ratio	0.73	0.44			0.69			0.58	0.25			
Control Delay	50.5	4.3			14.7			30.8	7.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	50.5	4.3			14.7			30.8	7.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B			C	A			
Approach Delay		12.4			14.7			23.0				
Approach LOS		B			B			C				
Queue Length 50th (ft)	47	49			151			65	0			
Queue Length 95th (ft)	m#100	71			#361			110	29			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	162	1262			1010			413	435			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.73	0.44			0.69			0.44	0.20			

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 54 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 15.1 Intersection LOS: B
Intersection Capacity Utilization 60.2% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



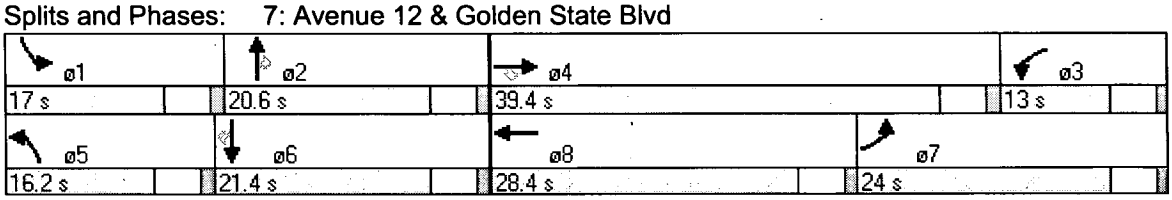
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		2				313			36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	276	418	14	101	343	10	149	9	288	170	9	33
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	300	454	15	110	373	11	162	10	313	185	10	36
Lane Group Flow (vph)	300	454	15	110	384	0	162	10	313	185	10	36
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Detector Phases	7	4	4	3	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	24.0	39.4	39.4	13.0	28.4	0.0	16.2	20.6	20.6	17.0	21.4	21.4
Total Split (%)	26.7%	43.8%	43.8%	14.4%	31.6%	0.0%	18.0%	22.9%	22.9%	18.9%	23.8%	23.8%
Maximum Green (s)	19.4	34.8	34.8	8.4	23.8		11.6	16.0	16.0	12.4	16.8	16.8
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	19.7	43.7	43.7	8.7	32.7		11.7	9.1	9.1	12.5	9.9	9.9
Actuated g/C Ratio	0.22	0.49	0.49	0.10	0.36		0.13	0.10	0.10	0.14	0.11	0.11
v/c Ratio	0.81	0.53	0.02	0.67	0.59		0.74	0.06	0.72	0.79	0.05	0.18
Control Delay	52.0	20.1	7.6	59.9	29.6		58.8	34.1	14.5	61.8	33.3	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	20.1	7.6	59.9	29.6		58.8	34.1	14.5	61.8	33.3	13.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	E	C		E	C	B	E	C	B
Approach Delay		32.3			36.3			29.7			53.0	
Approach LOS		C			D			C			D	
Queue Length 50th (ft)	162	163	0	61	167		89	5	0	102	5	0
Queue Length 95th (ft)	#292	311	12	#134	#340		#180	19	71	#206	19	25
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	375	863	741	170	650		229	328	534	244	343	321
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.53	0.02	0.65	0.59		0.71	0.03	0.59	0.76	0.03	0.11

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 35.1 Intersection LOS: D
Intersection Capacity Utilization 60.0% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



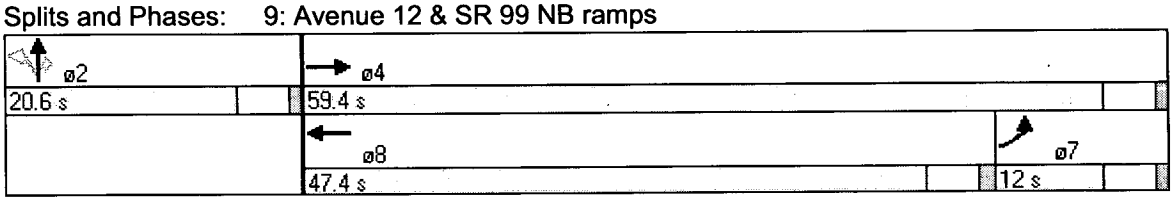
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.915				0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1656	0	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1656	0	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					165				149			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	114	762	0	0	280	470	174	1	131	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	130	866	0	0	318	534	198	1	149	0	0	0
Lane Group Flow (vph)	130	866	0	0	852	0	0	199	149	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	12.0	59.4	0.0	0.0	47.4	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	15.0%	74.3%	0.0%	0.0%	59.3%	0.0%	25.8%	25.8%	25.8%	0.0%	0.0%	0.0%
Maximum Green (s)	7.4	54.8			42.8		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	8.0	57.9			45.9			14.1	14.1			
Actuated g/C Ratio	0.10	0.72			0.57			0.18	0.18			
v/c Ratio	0.76	0.66			0.83			0.68	0.39			
Control Delay	63.6	9.5			21.2			42.7	8.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	63.6	9.5			21.2			42.7	8.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			C			D	A			
Approach Delay		16.6			21.2			27.9				
Approach LOS		B			C			C				
Queue Length 50th (ft)	64	198			272			93	0			
Queue Length 95th (ft)	#147	322			#536			153	43			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	172	1310			1021			345	426			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.76	0.66			0.83			0.58	0.35			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 20.2 Intersection LOS: C
Intersection Capacity Utilization 69.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt B
East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	169	1	67	160	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	8	8	1	14	36
Percent Heavy Vehicles	11	--	--	19	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	8	8	1	13	34
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	72	173	2	16	183	1
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	72		51			19	
C (m) (veh/h)	1349	1295		658			530	
v/c	0.01	0.06		0.08			0.04	
95% queue length	0.04	0.18		0.25			0.11	
Control Delay (s/veh)	7.7	7.9		10.9			12.0	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	10.9			12.0		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 18 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	236	4	89	253	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	11	5	1	10	93
Percent Heavy Vehicles	13	--	--	15	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	11	5	1	10	86
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	96	274	1	15	256	4
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	15	96		104			17	
C (m) (veh/h)	1227	1233		672			362	
v/c	0.01	0.08		0.15			0.05	
95% queue length	0.04	0.25		0.55			0.15	
Control Delay (s/veh)	8.0	8.2		11.3			15.4	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	11.3			15.4		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*S. Leon*	Intersection	*Ave 17 @ Road 23*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*7/17/06*	Analysis Year	*2008*
Analysis Time Period	*2008 Project AM*		

Project Description *04-837.1 Northfork Casino Alt B*

East/West Street: *Avenue 17* | North/South Street: *Road 23*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	170	107	22	118	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	2	47	9	118	19	9
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	2	44	9	109	18	9
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	23	128	1	5	184	116
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	23		146			58	
C (m) (veh/h)	1457	1261		481			511	
v/c	0.00	0.02		0.30			0.11	
95% queue length	0.01	0.06		1.27			0.38	
Control Delay (s/veh)	7.5	7.9		15.7			12.9	
LOS	A	A		C			B	
Approach Delay (s/veh)	--	--	15.7			12.9		
Approach LOS	--	--	C			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 17	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	6	180	226	36	183	5
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	7	91	21	222	55	30
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	7	84	20	205	51	28
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	39	198	5	6	195	245
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	6	39		307			119	
C (m) (veh/h)	1369	1120		313			371	
v/c	0.00	0.03		0.98			0.32	
95% queue length	0.01	0.11		10.36			1.36	
Control Delay (s/veh)	7.6	8.3		83.6			19.2	
LOS	A	A		F			C	
Approach Delay (s/veh)	--	--	83.6			19.2		
Approach LOS	--	--	F			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	23	392	49	140	545	311
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	24	426	53	152	592	338
Percent Heavy Vehicles	2	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	61	33	104	160	19	15
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	66	35	113	173	20	16
Percent Heavy Vehicles	21	21	21	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	24	152	66		148		209	
C (m) (veh/h)	736	1073	44		170		26	
v/c	0.03	0.14	1.50		0.87		8.04	
95% queue length	0.10	0.49	6.54		6.20		25.90	
Control Delay (s/veh)	10.1	8.9	459.9		92.7		3462	
LOS	B	A	F		F		F	
Approach Delay (s/veh)	--	--	205.9			3462		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	34	875	84	212	819	480
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	36	951	91	230	890	521
Percent Heavy Vehicles	2	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	76	85	245	512	49	30
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	82	92	266	556	53	32
Percent Heavy Vehicles	4	4	4	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	36	230	82		358		641	
C (m) (veh/h)	483	641			0			
v/c	0.07	0.36						
95% queue length	0.24	1.63						
Control Delay (s/veh)	13.1	13.7						
LOS	B	B			F			
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt B

East/West Street: Ellis

North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	28	3	12	16	0	106
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	27	658	10	81	358	14
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	46		132		386	367	282	209
% Heavy Vehicles	8		8		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.7		0.1		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.3		0.9		0.0	0.0	0.0	0.1
Prop. Heavy Vehicle	0.1		0.1		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	0.0	0.2	-0.0

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.04		0.12		0.34	0.33	0.25	0.19
hd, final value (s)	6.89		6.15		5.83	5.77	6.25	6.04
x, final value	0.09		0.23		0.62	0.59	0.49	0.35
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	4.9		4.1		3.5	3.5	4.0	3.7

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	296		382		611	616	532	459
Delay (s/veh)	10.55		10.93		17.73	16.37	14.81	11.98
LOS	B		B		C	C	B	B
Approach: Delay (s/veh)	10.55		10.93		17.07		13.60	
LOS	B		B		C		B	
Intersection Delay (s/veh)	15.09							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt B

East/West Street: Ellis

North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	38	12	10	48	4	187
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	39	648	70	174	923	96
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	64		259		394	428	690	606
% Heavy Vehicles	2		2		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.6		0.2		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.2		0.8		0.0	0.2	0.0	0.2
Prop. Heavy Vehicle	0.0		0.0		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	-0.1	0.2	-0.1

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.06		0.23		0.35	0.38	0.61	0.54
hd, final value (s)	8.32		6.93		7.44	7.25	7.31	7.05
x, final value	0.15		0.50		0.81	0.86	1.40	1.19
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	6.3		4.9		5.1	5.0	5.0	4.7

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	314		509		484	496	690	606
Delay (s/veh)	12.76		16.61		35.15	40.41	213.30	126.02
LOS	B		C		E	E	F	F
Approach: Delay (s/veh)	12.76		16.61		37.89		172.49	
LOS	B		C		E		F	
Intersection Delay (s/veh)	106.43							
Intersection LOS	F							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave15.5 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 15-1/2 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	255	8	0	214	21
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	1	0	26	1	23
Percent Heavy Vehicles	8	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	1	0	24	1	22
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	232	22	0	277	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	0	0		50			1	
C (m) (veh/h)	1277	1233		539			456	
v/c	0.00	0.00		0.09			0.00	
95% queue length	0.00	0.00		0.31			0.01	
Control Delay (s/veh)	7.8	7.9		12.4			12.9	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	12.4			12.9		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave15.5 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 15-1/2 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	365	31	1	354	90
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	2	1	28	3	46
Percent Heavy Vehicles	17	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	2	1	26	3	43
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	384	97	1	396	33
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		77			3	
C (m) (veh/h)	1008	1094		419			281	
v/c	0.00	0.00		0.18			0.01	
95% queue length	0.00	0.00		0.67			0.03	
Control Delay (s/veh)	8.6	8.3		15.5			17.9	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	15.5			17.9		
Approach LOS	--	--	C			C		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	12	125	29	10	115	44
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	129	15	28	80	40
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	179		181		175		159	
% Heavy Vehicles	5		11		20		15	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.1		0.1		0.1		0.2	
Prop. Right-Turns	0.2		0.3		0.1		0.3	
Prop. Heavy Vehicle	0.0		0.1		0.2		0.1	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		0.0		0.3		0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.16		0.16		0.16		0.14	
hd, final value (s)	5.10		5.14		5.42		5.28	
x, final value	0.25		0.26		0.26		0.23	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.1		3.1		3.4		3.3	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	429		431		425		409	
Delay (s/veh)	9.83		9.93		10.35		9.87	
LOS	A		A		B		A	
Approach: Delay (s/veh)	9.83		9.93		10.35		9.87	
LOS	A		A		B		A	
Intersection Delay (s/veh)	9.99							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	33	95	46	19	160	93
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	215	20	74	223	47
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	187		294		309		373	
% Heavy Vehicles	8		4		6		16	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1		0.2		0.2	
Prop. Right-Turns	0.3		0.3		0.1		0.1	
Prop. Heavy Vehicle	0.1		0.0		0.1		0.2	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.0		-0.1		0.1		0.2	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.17		0.26		0.27		0.33	
hd, final value (s)	7.02		6.57		6.58		6.56	
x, final value	0.36		0.54		0.56		0.68	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	5.0		4.6		4.6		4.6	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	433		497		505		521	
Delay (s/veh)	13.99		16.92		17.78		22.32	
LOS	B		C		C		C	
Approach: Delay (s/veh)	13.99		16.92		17.78		22.32	
LOS	B		C		C		C	
Intersection Delay (s/veh)	18.41							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 @ Schnoor
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 16 | North/South Street: Schnoor

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	48	8	90	4	18	27
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	280	24	45	230	47	10
Percent Heavy Vehicles	2	--	--	36	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	258	23	42	212	44	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	4	19	29	52	8	97
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	52	4	230		57		349	
C (m) (veh/h)	1559	1299	695		742		692	
v/c	0.03	0.00	0.33		0.08		0.50	
95% queue length	0.10	0.01	1.45		0.25		2.86	
Control Delay (s/veh)	7.4	7.8	12.7		10.3		15.4	
LOS	A	A	B		B		C	
Approach Delay (s/veh)	--	--	12.2			15.4		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*S. Leon*	Intersection	*Ave 16 @ Schnoor*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*7/17/06*	Analysis Year	*2008*
Analysis Time Period	*2008 Project PM*		

Project Description *04-837.1 Northfork Casino Alt B*

East/West Street: *Avenue 16* | North/South Street: *Schnoor*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	81	15	212	8	27	38
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	351	46	116	559	88	27
Percent Heavy Vehicles	13	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	323	43	107	515	81	25
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	8	29	41	88	16	230
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	88	8	559		115		513	
C (m) (veh/h)	1464	1320	478		657		505	
v/c	0.06	0.01	1.17		0.18		1.02	
95% queue length	0.19	0.02	20.40		0.63		14.38	
Control Delay (s/veh)	7.6	7.7	124.3		11.6		72.9	
LOS	A	A	F		B		F	
Approach Delay (s/veh)	--	--	105.0			72.9		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/26/2006 11:16 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt B

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	130	381	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	239	0	6	2	105	197
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	141	414			259	6	116	214
% Heavy Vehicles	3	3			14	14	6	6
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.1	0.1	0.1	0.1
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.5			0.7	-0.5	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.13	0.37			0.23	0.01	0.10	0.19
hd, final value (s)	5.64	5.04			7.16	5.94	6.51	5.79
x, final value	0.22	0.58			0.52	0.01	0.21	0.34
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	3.6	3.0			4.9	3.6	4.2	3.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	391	664			485	256	366	464
Delay (s/veh)	10.23	14.75			17.22	8.70	10.94	11.50
LOS	B	B			C	A	B	B
Approach: Delay (s/veh)	13.60				17.02		11.30	
LOS	B				C		B	
Intersection Delay (s/veh)	13.73							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt B

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	285	675	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	524	0	10	3	190	466
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	309	733			569	10	209	506
% Heavy Vehicles	2	2			2	2	4	4
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.0	-0.6			0.5	-0.7	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.27	0.65			0.51	0.01	0.19	0.45
hd, final value (s)	7.07	6.46			8.77	7.52	7.94	7.20
x, final value	0.61	1.31			1.39	0.02	0.46	1.01
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	5.1	4.5			6.5	5.2	5.6	4.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	510	733			569	260	454	506
Delay (s/veh)	20.38	174.32			212.11	10.38	17.23	70.07
LOS	C	F			F	B	C	F
Approach: Delay (s/veh)	128.67				208.63		54.63	
LOS	F				F		F	
Intersection Delay (s/veh)	125.83							
Intersection LOS	F							

Copyright © 2005 University of Florida, All Rights Reserved

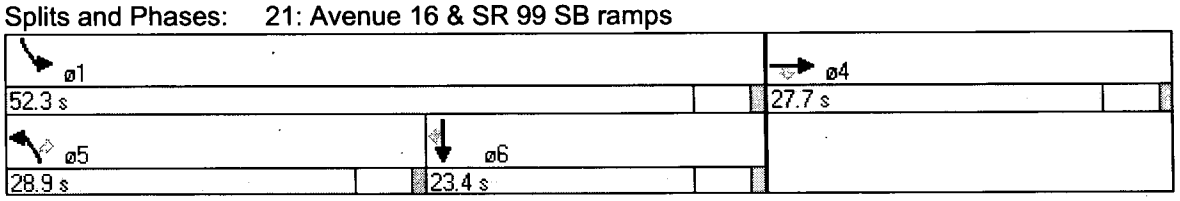
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			414						7	2		214
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	130	381	0	0	0	239	0	6	2	105	197
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
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	14%	14%	14%	6%	6%	6%
Adj. Flow (vph)	0	141	414	0	0	0	260	0	7	2	114	214
Lane Group Flow (vph)	0	141	414	0	0	0	260	0	7	2	114	214
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	27.7	27.7	0.0	0.0	0.0	28.9	0.0	28.9	52.3	23.4	23.4
Total Split (%)	0.0%	34.6%	34.6%	0.0%	0.0%	0.0%	36.1%	0.0%	36.1%	65.4%	29.3%	29.3%
Maximum Green (s)		22.8	22.8				24.0		24.0	47.4	18.5	18.5
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		23.7	23.7				24.9		24.9	15.7	19.4	19.4
Actuated g/C Ratio		0.30	0.30				0.31		0.31	0.18	0.24	0.24
v/c Ratio		0.26	0.55				0.53		0.02	0.01	0.26	0.40
Control Delay		23.0	5.5				27.4		11.7	12.0	26.5	6.4
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		23.0	5.5				27.4		11.7	12.0	26.5	6.4
LOS		C	A				C		B	B	C	A
Approach Delay		10.0									13.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A									B	
Queue Length 50th (ft)		53	0				106		0	0	46	0
Queue Length 95th (ft)		99	63				179		9	3	90	51
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		547	756				493		446	704	435	532
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.26	0.55				0.53		0.02	0.00	0.26	0.40

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 14.9 Intersection LOS: B
Intersection Capacity Utilization 35.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



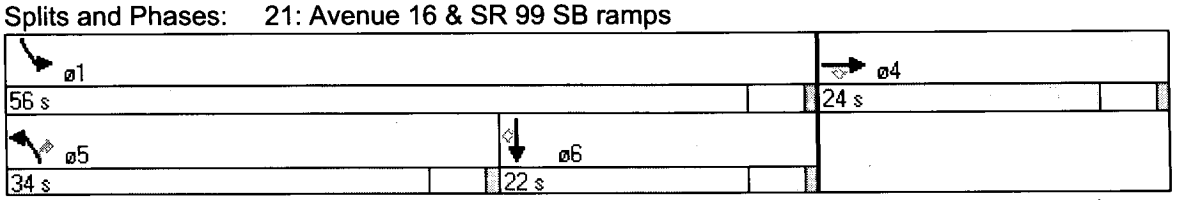
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			734						11	3		507
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	285	675	0	0	0	524	0	10	3	190	466
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	310	734	0	0	0	570	0	11	3	207	507
Lane Group Flow (vph)	0	310	734	0	0	0	570	0	11	3	207	507
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	24.0	24.0	0.0	0.0	0.0	34.0	0.0	34.0	56.0	22.0	22.0
Total Split (%)	0.0%	30.0%	30.0%	0.0%	0.0%	0.0%	42.5%	0.0%	42.5%	70.0%	27.5%	27.5%
Maximum Green (s)		19.1	19.1				29.1		29.1	51.1	17.1	17.1
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		20.0	20.0				30.0		30.0	16.5	18.0	18.0
Actuated g/C Ratio		0.25	0.25				0.38		0.38	0.19	0.22	0.22
v/c Ratio		0.67	0.78				0.86		0.02	0.01	0.50	0.68
Control Delay		35.0	8.9				38.2		8.8	10.3	32.1	8.1
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		35.0	8.9				38.2		8.8	10.3	32.1	8.1
LOS		D	A				D		A	B	C	A
Approach Delay		16.7									15.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B									B	
Queue Length 50th (ft)		139	0				257		0	0	91	0
Queue Length 95th (ft)		225	105				#442		10	3	156	82
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		466	946				664		601	759	411	742
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.67	0.78				0.86		0.02	0.00	0.50	0.68

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 64.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	SR 99 NB ramps at Avenue 16
Agency/Co.	TPG Consulting, Inc	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description	04-837.1 Northfork Casino Alt B
East/West Street: Avenue 16 connector	North/South Street: SR 99 NB ramps
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		145			6	133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	304	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	280					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	6	144	0	157	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						304		
C (m) (veh/h)						758		
v/c						0.40		
95% queue length						1.94		
Control Delay (s/veh)						12.9		
LOS						B		
Approach Delay (s/veh)	--	--				12.9		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		213			10	299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	482	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	444					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	10	324	0	231	0
Percent Heavy Vehicles	2	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						482		
C (m) (veh/h)						603		
v/c						0.80		
95% queue length						7.86		
Control Delay (s/veh)						30.5		
LOS						D		
Approach Delay (s/veh)	--	--				30.5		
Approach LOS	--	--				D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		112		280	206	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	144
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	304	223	0	0	121	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		304			144			
C (m) (veh/h)		1430			930			
v/c		0.21			0.15			
95% queue length		0.81			0.55			
Control Delay (s/veh)		8.2			9.6			
LOS		A			A			
Approach Delay (s/veh)	--	--	9.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description	04-837.1 Northfork Casino Alt B
East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235		444	421	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	324
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	482	457	0	0	255	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		482			324			
C (m) (veh/h)		1265			784			
v/c		0.38			0.41			
95% queue length		1.81			2.04			
Control Delay (s/veh)		9.6			12.8			
LOS		A			B			
Approach Delay (s/veh)	--	--	12.8					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		112	145		206	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	6	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				6		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	223	0	0	121	157
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			6					
C (m) (veh/h)			588					
v/c			0.01					
95% queue length			0.03					
Control Delay (s/veh)			11.2					
LOS			B					
Approach Delay (s/veh)	--	--	11.2					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt B

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235	213		421	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	457	0	0	255	231
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			10					
C (m) (veh/h)			341					
v/c			0.03					
95% queue length			0.09					
Control Delay (s/veh)			15.9					
LOS			C					
Approach Delay (s/veh)	--	--	15.9					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

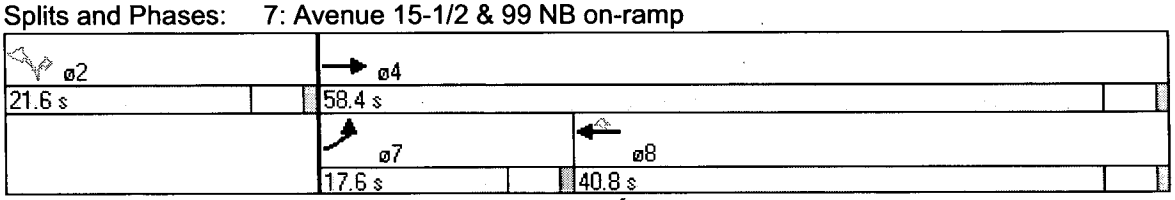
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						203			200			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	124	705	0	0	1025	187	344	0	184	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	135	766	0	0	1114	203	374	0	200	0	0	0
Lane Group Flow (vph)	135	766	0	0	1114	203	374	0	200	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	17.6	58.4	0.0	0.0	40.8	40.8	21.6	0.0	21.6	0.0	0.0	0.0
Total Split (%)	22.0%	73.0%	0.0%	0.0%	51.0%	51.0%	27.0%	0.0%	27.0%	0.0%	0.0%	0.0%
Maximum Green (s)	13.0	53.8			36.2	36.2	17.0		17.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	11.5	57.3			41.8	41.8	14.7		14.7			
Actuated g/C Ratio	0.14	0.72			0.52	0.52	0.18		0.18			
v/c Ratio	0.53	0.30			0.61	0.22	0.63		0.46			
Control Delay	51.5	0.4			16.3	2.7	34.7		8.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	51.5	0.4			16.3	2.7	34.7		8.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B	A	C		A			
Approach Delay		8.0			14.2							
Approach LOS		A			B							
Queue Length 50th (ft)	75	1			196	0	89		0			
Queue Length 95th (ft)	m118	1			294	34	127		51			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	302	2535			1815	909	713		485			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.45	0.30			0.61	0.22	0.52		0.41			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 61.0% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						285			27			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	238	1770	0	0	1679	339	699	0	311	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	259	1924	0	0	1825	368	760	0	338	0	0	0
Lane Group Flow (vph)	259	1924	0	0	1825	368	760	0	338	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	20.8	81.5	0.0	0.0	60.7	60.7	28.5	0.0	28.5	0.0	0.0	0.0
Total Split (%)	18.9%	74.1%	0.0%	0.0%	55.2%	55.2%	25.9%	0.0%	25.9%	0.0%	0.0%	0.0%
Maximum Green (s)	16.2	76.9			56.1	56.1	23.9		23.9			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	16.8	77.5			56.7	56.7	24.5		24.5			
Actuated g/C Ratio	0.15	0.70			0.52	0.52	0.22		0.22			
v/c Ratio	0.96	0.77			1.00	0.39	1.00		0.91			
Control Delay	70.8	2.0			48.4	5.0	76.9		68.7			
Queue Delay	0.0	2.4			1.4	0.0	0.0		0.0			
Total Delay	70.8	4.4			49.8	5.0	76.9		68.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			D	A	E		E			
Approach Delay		12.2			42.3							
Approach LOS		B			D							
Queue Length 50th (ft)	193	81			~653	29	~279		218			
Queue Length 95th (ft)	m189	m77			#846	83	#408		#391			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	270	2493			1824	954	757		370			
Starvation Cap Reductn	0	421			0	0	0		0			
Spillback Cap Reductn	0	0			10	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.96	0.93			1.01	0.39	1.00		0.91			

Intersection Summary

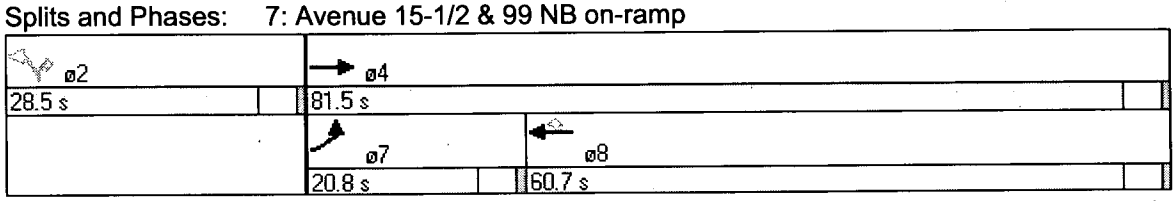
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 108 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 36.7 Intersection LOS: D
Intersection Capacity Utilization 132.5% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 15-1/2 & 99 NB on-ramp



2008 Project AM Alt B
5: Avenue 15-1/2 & 99 SB off-ramp 7/25/2006

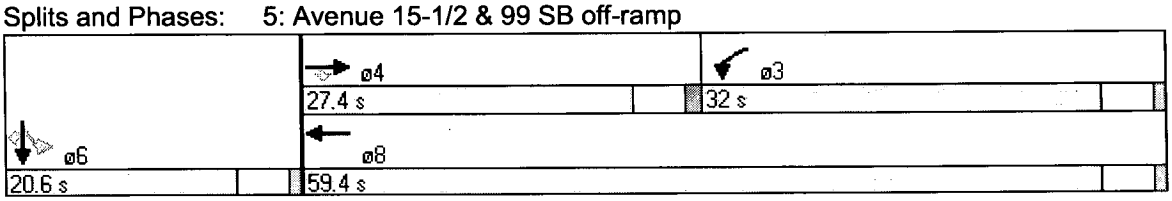
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			385									91
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	671	354	361	1008	0	0	0	0	163	1	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	729	385	392	1096	0	0	0	0	177	1	91
Lane Group Flow (vph)	0	729	385	392	1096	0	0	0	0	0	178	91
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	27.4	27.4	32.0	59.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	34.3%	34.3%	40.0%	74.3%	0.0%	0.0%	0.0%	0.0%	25.8%	25.8%	25.8%
Maximum Green (s)		22.8	22.8	27.4	54.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		26.8	26.8	28.0	58.8						13.2	13.2
Actuated g/C Ratio		0.34	0.34	0.35	0.74						0.16	0.16
v/c Ratio		0.62	0.49	0.64	0.43						0.61	0.27
Control Delay		25.7	5.0	20.3	0.7						39.6	8.7
Queue Delay		0.0	0.0	0.1	0.2						0.0	0.0
Total Delay		25.7	5.0	20.5	0.9						39.6	8.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A						D	A
Approach Delay		18.5			6.0						29.1	
Approach LOS		B			A						C	
Queue Length 50th (ft)		159	0	155	2						83	0
Queue Length 95th (ft)		231	61	233	6						140	36
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1185	786	608	2551						368	401
Starvation Cap Reductn		0	0	11	518						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.62	0.49	0.66	0.54						0.48	0.23

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 46 (58%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 61.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.952	
Satd. Flow (prot)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Flt Permitted				0.950							0.952	
Satd. Flow (perm)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			472									12
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1597	575	296	2082	0	0	0	0	397	1	199
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1736	625	322	2263	0	0	0	0	432	1	216
Lane Group Flow (vph)	0	1736	625	322	2263	0	0	0	0	0	433	216
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	56.6	56.6	23.4	80.0	0.0	0.0	0.0	0.0	30.0	30.0	30.0
Total Split (%)	0.0%	51.5%	51.5%	21.3%	72.7%	0.0%	0.0%	0.0%	0.0%	27.3%	27.3%	27.3%
Maximum Green (s)		52.0	52.0	18.8	75.4					25.4	25.4	25.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		52.6	52.6	19.4	76.0						26.0	26.0
Actuated g/C Ratio		0.48	0.48	0.18	0.69						0.24	0.24
v/c Ratio		1.03	0.62	1.03	0.93						1.03	0.56
Control Delay		57.9	7.8	64.0	10.6						94.8	41.5
Queue Delay		0.0	0.0	0.0	10.6						0.0	0.0
Total Delay		57.9	7.8	64.0	21.2						94.8	41.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A	E	C						F	D
Approach Delay		44.7			26.5						77.1	
Approach LOS		D			C						E	
Queue Length 50th (ft)		~690	61	~241	274						~329	128
Queue Length 95th (ft)		#828	173	m#240	m274						#525	208
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1692	1003	312	2445						419	383
Starvation Cap Reductn		0	0	0	206						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		1.03	0.62	1.03	1.01						1.03	0.56

Intersection Summary

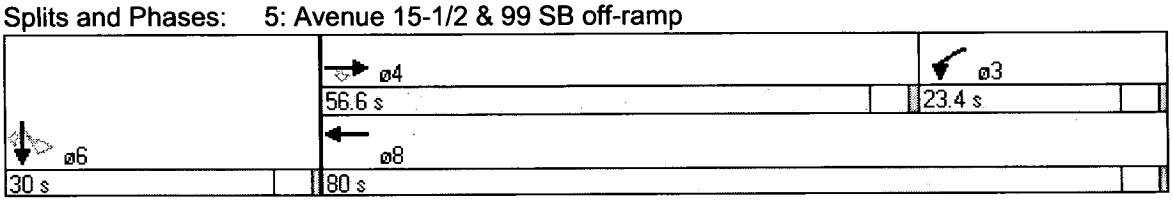
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 96 (87%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 40.0 Intersection LOS: D
Intersection Capacity Utilization 132.5% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 15-1/2 & 99 SB off-ramp



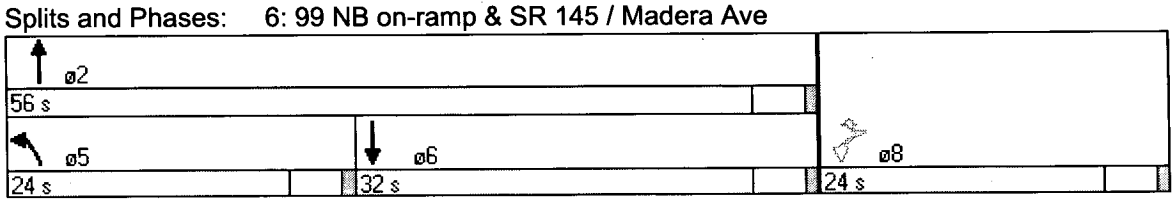
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.902	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46					187	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	377	0	42	382	502	0	0	165	444
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	410	0	46	415	546	0	0	179	483
Lane Group Flow (vph)	0	0	0	410	0	46	415	546	0	0	662	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	24.0	0.0	24.0	24.0	56.0	0.0	0.0	32.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	30.0%	0.0%	30.0%	30.0%	70.0%	0.0%	0.0%	40.0%	0.0%
Maximum Green (s)				19.4		19.4	19.4	51.4			27.4	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				19.9		19.9	20.1	52.1			28.0	
Actuated g/C Ratio				0.25		0.25	0.25	0.65			0.35	
v/c Ratio				0.93		0.11	0.93	0.45			0.93	
Control Delay				60.0		8.4	53.9	10.6			40.7	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				60.0		8.4	53.9	10.6			40.7	
LOS				E		A	D	B			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								29.3			40.7	
Approach LOS								C			D	
Queue Length 50th (ft)				200		0	218	187			238	
Queue Length 95th (ft)				#368		25	#380	237			#461	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				443		430	445	1213			710	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.93		0.11	0.93	0.45			0.93	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 8 (10%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 38.5 Intersection LOS: D
Intersection Capacity Utilization 88.0% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
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
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.915	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1704	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1704	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41					100	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	250	0	38	600	685	0	0	259	445
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	272	0	41	652	745	0	0	282	484
Lane Group Flow (vph)	0	0	0	272	0	41	652	745	0	0	766	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	37.0	79.4	0.0	0.0	42.4	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.6%	0.0%	20.6%	37.0%	79.4%	0.0%	0.0%	42.4%	0.0%
Maximum Green (s)				16.0		16.0	32.4	74.8			37.8	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				16.6		16.6	33.0	75.4			38.4	
Actuated g/C Ratio				0.17		0.17	0.33	0.75			0.38	
v/c Ratio				0.93		0.14	1.12	0.53			1.07	
Control Delay				79.0		12.5	94.9	7.3			81.5	
Queue Delay				0.0		0.0	0.0	1.3			0.0	
Total Delay				79.0		12.5	94.9	8.6			81.5	
LOS				E		B	F	A			F	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								48.9			81.5	
Approach LOS								D			F	
Queue Length 50th (ft)				173		0	~486	209			~503	
Queue Length 95th (ft)				#327		30	m#535	m229			#733	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				294		297	584	1405			716	
Starvation Cap Reductn				0		0	0	431			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.93		0.14	1.12	0.76			1.07	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 13 (13%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 61.7 Intersection LOS: E
Intersection Capacity Utilization 98.0% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: 99 NB on-ramp & SR 145 / Madera Ave

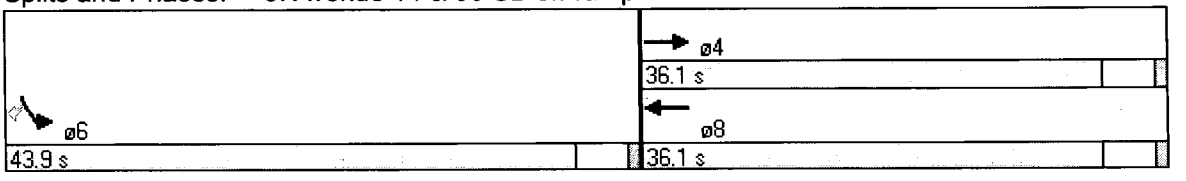
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						251
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	434	417	0	491	300
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	472	453	0	534	326
Lane Group Flow (vph)	0	472	453	0	534	326
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	36.1	36.1	0.0	43.9	43.9
Total Split (%)	0.0%	45.1%	45.1%	0.0%	54.9%	54.9%
Maximum Green (s)		31.5	31.5		39.3	39.3
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		42.5	42.5		29.5	29.5
Actuated g/C Ratio		0.53	0.53		0.37	0.37
v/c Ratio		0.25	0.46		0.83	0.44
Control Delay		12.2	4.5		33.4	5.8
Queue Delay		0.1	0.5		0.4	0.0
Total Delay		12.3	5.0		33.8	5.8
LOS		B	A		C	A
Approach Delay		12.3	5.0		23.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		C	
Queue Length 50th (ft)		63	13		236	24
Queue Length 95th (ft)		120	79		283	61
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1878	989		874	908
Starvation Cap Reductn		0	210		0	0
Spillback Cap Reductn		573	0		76	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.36	0.58		0.67	0.36

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 15.7 Intersection LOS: B
Intersection Capacity Utilization 55.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						200
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	561	314	0	652	184
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	610	341	0	709	200
Lane Group Flow (vph)	0	610	341	0	709	200
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	36.3	36.3	0.0	63.7	63.7
Total Split (%)	0.0%	36.3%	36.3%	0.0%	63.7%	63.7%
Maximum Green (s)		31.7	31.7		59.1	59.1
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		47.8	47.8		44.2	44.2
Actuated g/C Ratio		0.48	0.48		0.44	0.44
v/c Ratio		0.36	0.38		0.91	0.25
Control Delay		19.2	19.6		41.3	2.4
Queue Delay		0.0	6.2		12.3	0.0
Total Delay		19.2	25.8		53.5	2.4
LOS		B	C		D	A
Approach Delay		19.2	25.8		42.3	
Approach LOS		B	C		D	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		125	132		406	0
Queue Length 95th (ft)		210	208		452	30
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1693	891		1057	1026
Starvation Cap Reductn		0	487		0	0
Spillback Cap Reductn		64	0		330	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.37	0.84		0.98	0.19

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 31.7 Intersection LOS: C
Intersection Capacity Utilization 59.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: Avenue 14 & 99 SB off-ramp

2008 Project AM Alt B
1: Avenue 14 & SR 145 / Madera Ave 7/25/2006

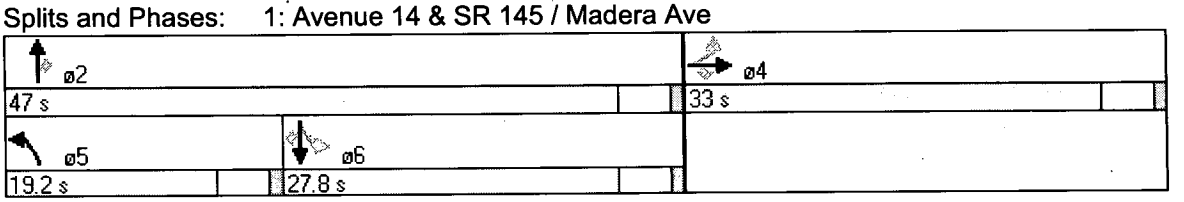
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.966					0.950				0.998	
Satd. Flow (prot)	0	1748	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted		0.966					0.950				0.925	
Satd. Flow (perm)	0	1748	1538	0	0	0	1752	1845	1568	0	3242	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			590						21			285
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	268	114	543	0	0	0	155	617	19	11	269	262
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	291	124	590	0	0	0	168	671	21	12	292	285
Lane Group Flow (vph)	0	415	590	0	0	0	168	671	21	0	304	285
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	33.0	33.0	33.0	0.0	0.0	0.0	19.2	47.0	47.0	27.8	27.8	27.8
Total Split (%)	41.3%	41.3%	41.3%	0.0%	0.0%	0.0%	24.0%	58.8%	58.8%	34.8%	34.8%	34.8%
Maximum Green (s)	28.4	28.4	28.4				14.6	42.4	42.4	23.2	23.2	23.2
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		28.7	28.7				12.8	43.3	43.3		26.5	26.5
Actuated g/C Ratio		0.36	0.36				0.16	0.54	0.54		0.33	0.33
v/c Ratio		0.66	0.63				0.60	0.67	0.02		0.28	0.40
Control Delay		25.1	7.3				40.1	17.9	4.2		9.8	2.6
Queue Delay		85.4	1.7				0.4	0.0	0.0		0.0	0.0
Total Delay		110.5	9.0				40.5	17.9	4.2		9.8	2.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				D	B	A		A	A
Approach Delay		50.9						22.0			6.3	
Approach LOS		D						C			A	
Queue Length 50th (ft)		122	0				78	237	0		24	0
Queue Length 95th (ft)		m244	m107				136	348	10		m58	m31
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		655	945				334	1020	876		1105	722
Starvation Cap Reductn		301	197				0	0	0		0	0
Spillback Cap Reductn		0	0				22	0	0		0	10
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.17	0.79				0.54	0.66	0.02		0.28	0.40

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 58 (73%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 30.1 Intersection LOS: C
Intersection Capacity Utilization 71.1% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.969					0.950				0.997	
Satd. Flow (prot)	0	1770	1553	0	0	0	1770	1863	1583	0	3529	1583
Flt Permitted		0.969					0.950				0.721	
Satd. Flow (perm)	0	1770	1553	0	0	0	1770	1863	1583	0	2552	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			576						16			208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	318	187	708	0	0	0	123	967	16	19	295	191
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	346	203	770	0	0	0	134	1051	17	21	321	208
Lane Group Flow (vph)	0	549	770	0	0	0	134	1051	17	0	342	208
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	37.0	37.0	37.0	0.0	0.0	0.0	19.1	63.0	63.0	43.9	43.9	43.9
Total Split (%)	37.0%	37.0%	37.0%	0.0%	0.0%	0.0%	19.1%	63.0%	63.0%	43.9%	43.9%	43.9%
Maximum Green (s)	32.4	32.4	32.4				14.5	58.4	58.4	39.3	39.3	39.3
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		32.5	32.5				12.6	59.5	59.5		42.9	42.9
Actuated g/C Ratio		0.32	0.32				0.13	0.60	0.60		0.43	0.43
v/c Ratio		0.95	0.86				0.60	0.95	0.02		0.31	0.26
Control Delay		52.0	18.0				52.3	37.6	4.1		6.3	0.8
Queue Delay		202.8	4.4				0.0	0.0	0.0		0.0	0.5
Total Delay		254.8	22.5				52.3	37.6	4.1		6.3	1.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	C				D	D	A		A	A
Approach Delay		119.2						38.8			4.5	
Approach LOS		F						D			A	
Queue Length 50th (ft)		365	137				81	587	0		26	3
Queue Length 95th (ft)		m#461	m196				140	#913	9		m35	m3
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		584	898				267	1108	948		1094	797
Starvation Cap Reductn		209	78				0	0	0		0	0
Spillback Cap Reductn		0	0				0	0	0		0	302
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.46	0.94				0.50	0.95	0.02		0.31	0.42

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 37 (37%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 67.2 Intersection LOS: E
Intersection Capacity Utilization 97.0% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Avenue 14 & SR 145 / Madera Ave

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	168			148	239
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	37	190	0	0	168	271
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				201		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	228	0	25
Percent Heavy Vehicles	0	0	0	25	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	37						253	
C (m) (veh/h)	958						447	
v/c	0.04						0.57	
95% queue length	0.12						3.43	
Control Delay (s/veh)	8.9						23.0	
LOS	A						C	
Approach Delay (s/veh)	–	–				23.0		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/8/2006 9:05 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	13	225			205	261
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	14	255	0	0	232	296
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				212		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	240	0	25
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	14						265	
C (m) (veh/h)	895						425	
v/c	0.02						0.62	
95% queue length	0.05						4.12	
Control Delay (s/veh)	9.1						26.5	
LOS	A						D	
Approach Delay (s/veh)	–	–				26.5		
Approach LOS	–	–				D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/8/2006 9:06 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	62			68	96
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	2	70	0	0	77	109
Percent Heavy Vehicles	8	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				98		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	111	0	2
Percent Heavy Vehicles	0	0	0	79	0	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	2						113	
C (m) (veh/h)	1353						691	
v/c	0.00						0.16	
95% queue length	0.00						0.58	
Control Delay (s/veh)	7.7						11.2	
LOS	A						B	
Approach Delay (s/veh)	–	–				11.2		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/8/2006 9:04 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	119			135	99
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	135	0	0	153	112
Percent Heavy Vehicles	5	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				107		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	121	0	2
Percent Heavy Vehicles	0	0	0	48	0	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	5						123	
C (m) (veh/h)	1282						607	
v/c	0.00						0.20	
95% queue length	0.01						0.75	
Control Delay (s/veh)	7.8						12.4	
LOS	A						B	
Approach Delay (s/veh)	--	--				12.4		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/8/2006 9:04 AM

ATTACHMENT VI – C - 13

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 7/25/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR 99-NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

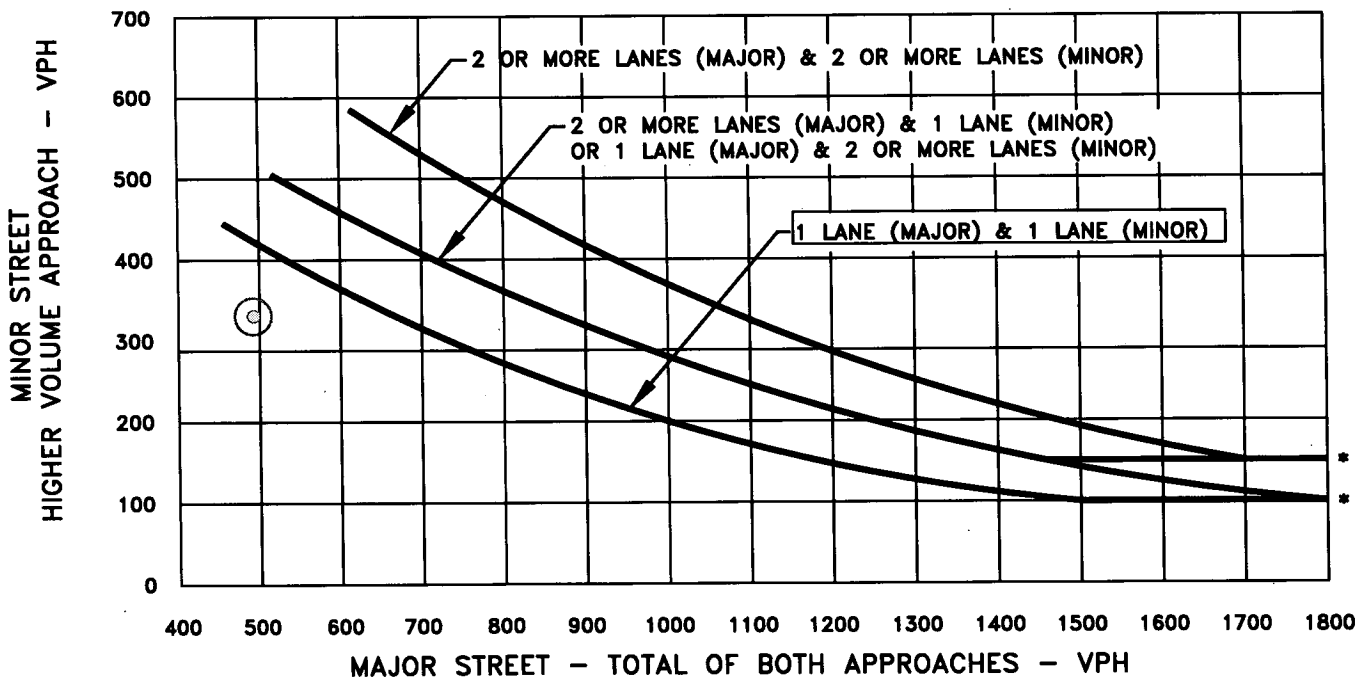
CONDITION: 2008 PROJECT ALT B

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		369	492			
Highest Approaches – Minor Street	✓		264	331			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

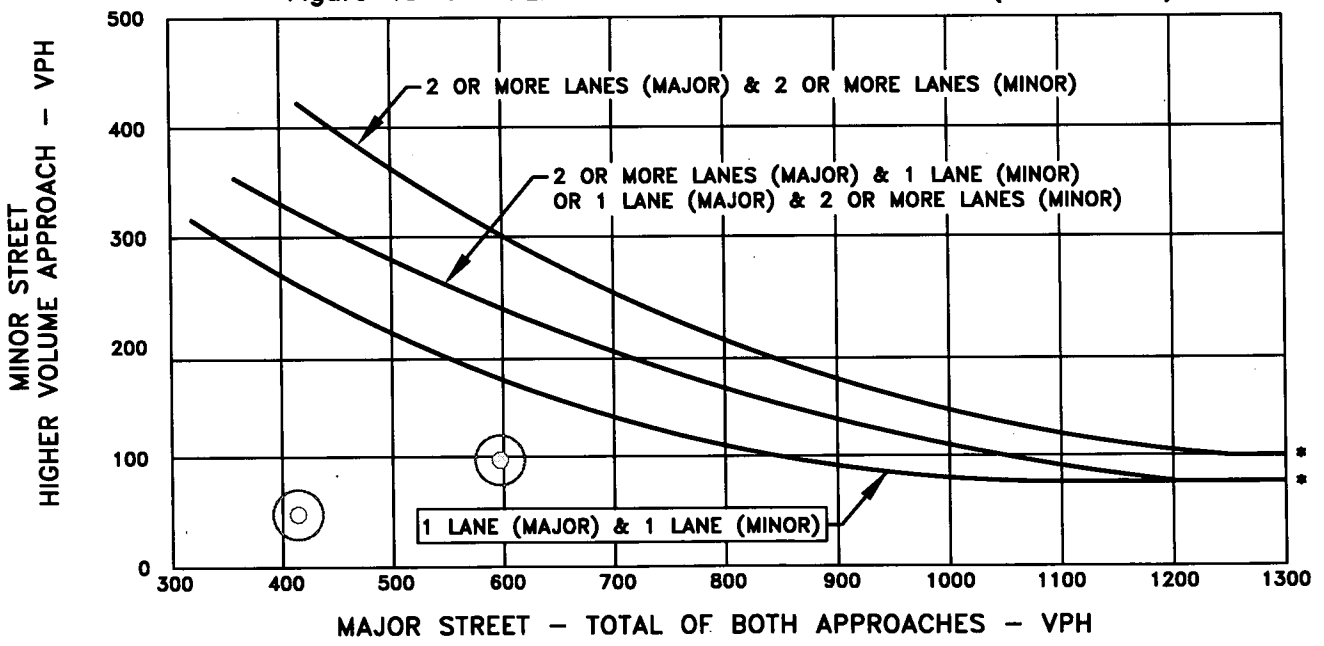
CONDITION: 2008 PROJECT ALT B

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		414	597				
Highest Approaches – Minor Street	✓		48	97				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 15 1/2 Critical Approach Speed NPS mph

MINOR STREET: ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

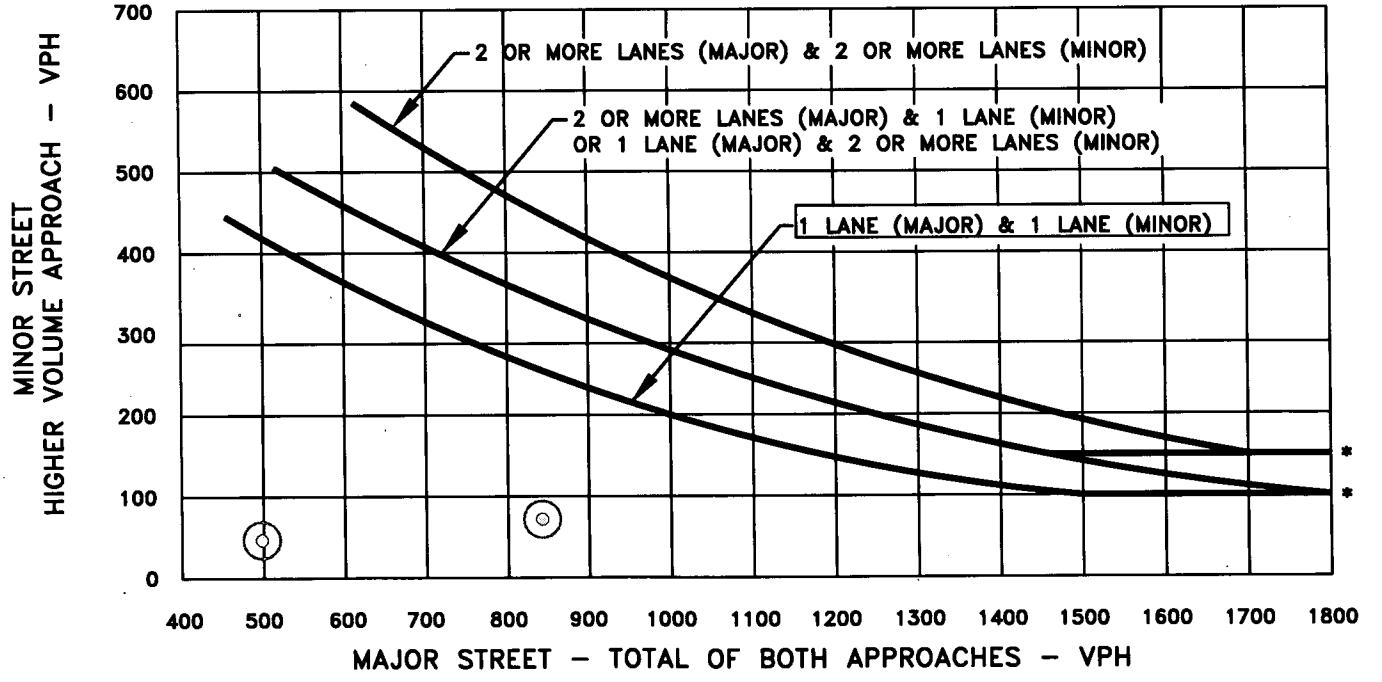
CONDITION: 2008 PROJECT ALT B

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		498	842			
Highest Approaches – Minor Street	✓		47	72			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 NB ON RAMP Critical Approach Speed NPS mph

MINOR STREET: GATEWAY/AVENUE 16 Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

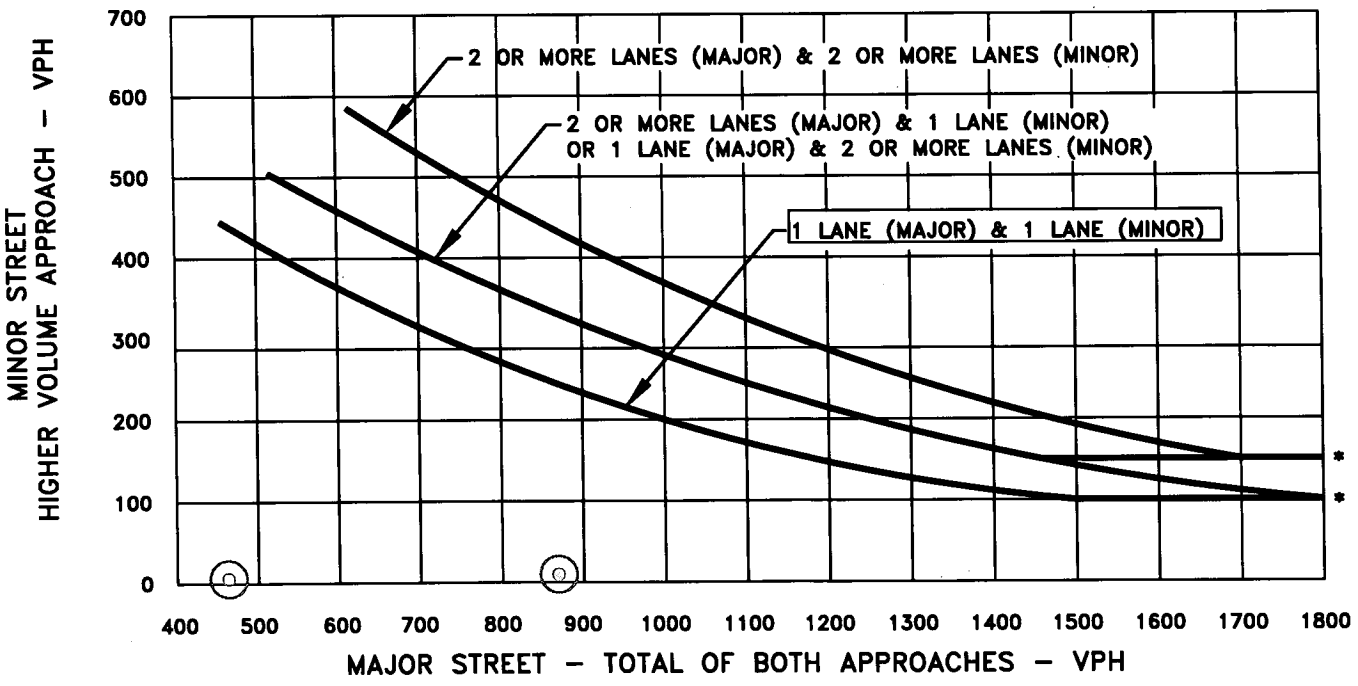
CONDITION: 2008 PROJECT ALT B

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		463	869			
Highest Approaches – Minor Street	✓		6	10			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: PISTACHIO DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

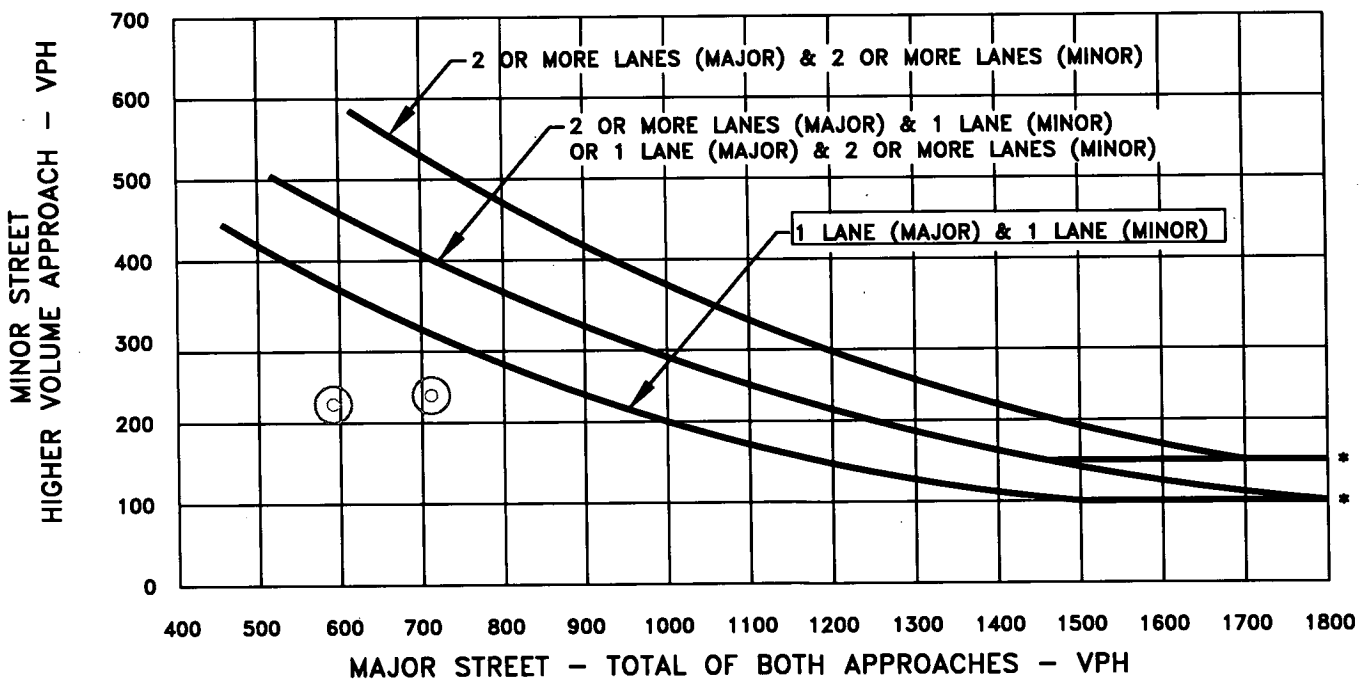
CONDITION: 2008 PROJECT ALTERNATIVE B

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		588	704			
Highest Approaches – Minor Street	✓		223	234			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: GOLDEN STATE BLVD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

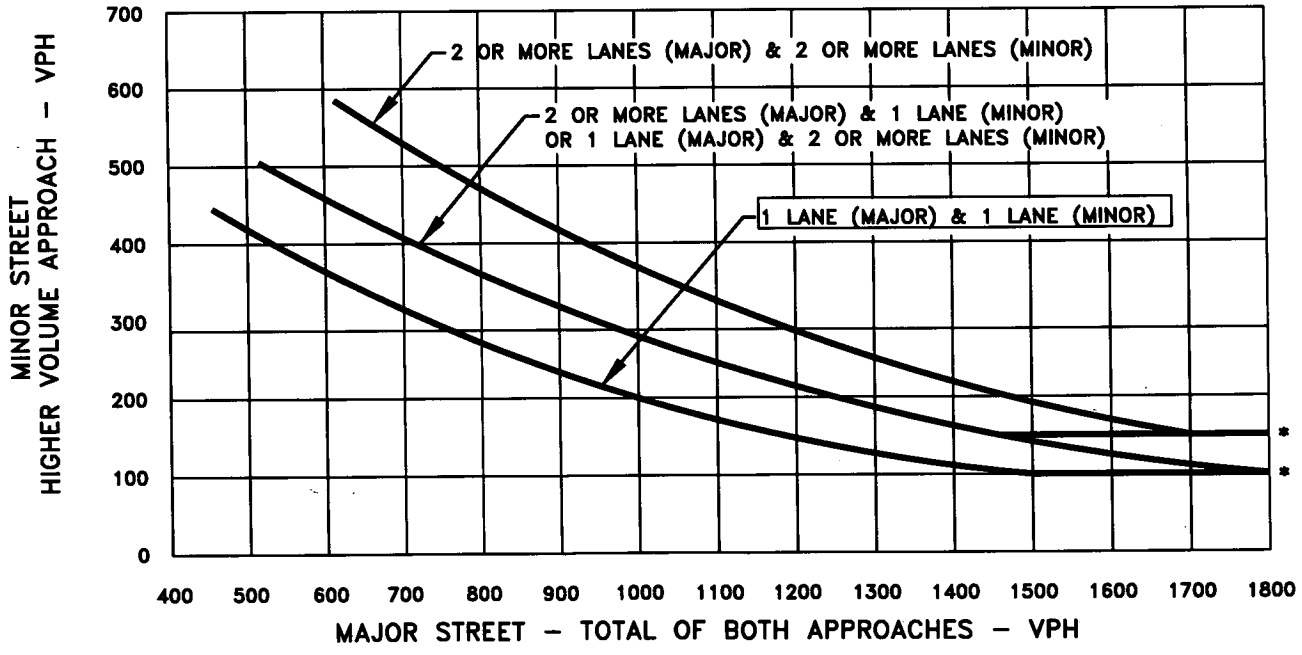
CONDITION: 2008 PROJECT ALTERNATIVE B

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		228	358			
Highest Approaches – Minor Street	✓		100	109			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting incorporated

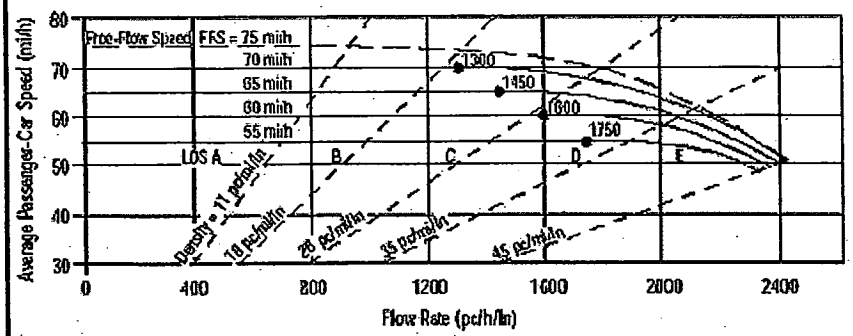
ATTACHMENT VI – C - 14

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2753*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1682*	pc/h/ln
S	*68.9*	mi/h
D = v_p / S	*24.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

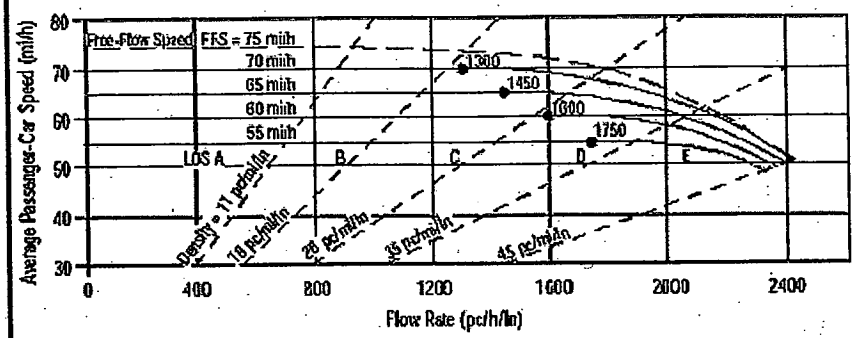
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2926*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

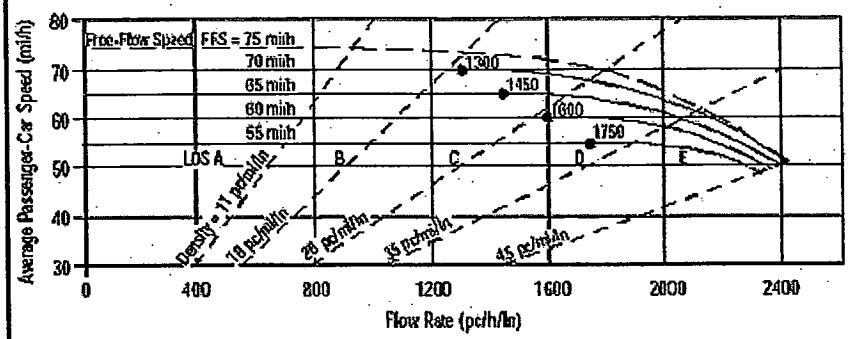
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1787*	pc/h/ln	Design LOS	
S	*68.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*26.3*	pc/mi/ln	S	mi/h
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/16/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

▩ Oper.(LOS) ▩ Des.(N) ▩ Planning Data

Flow Inputs

Volume, V	*2308*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

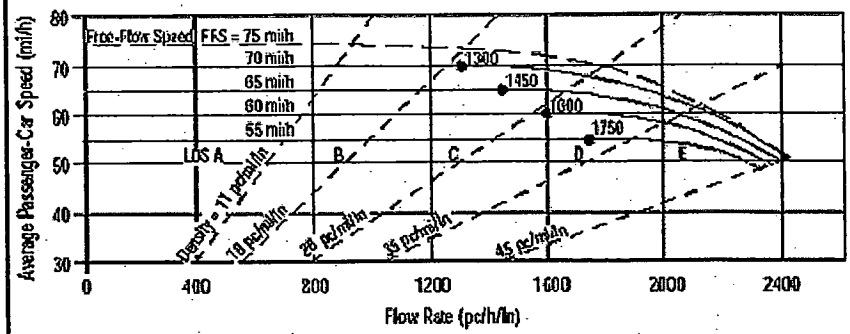
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1410*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*20.2*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*3500*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

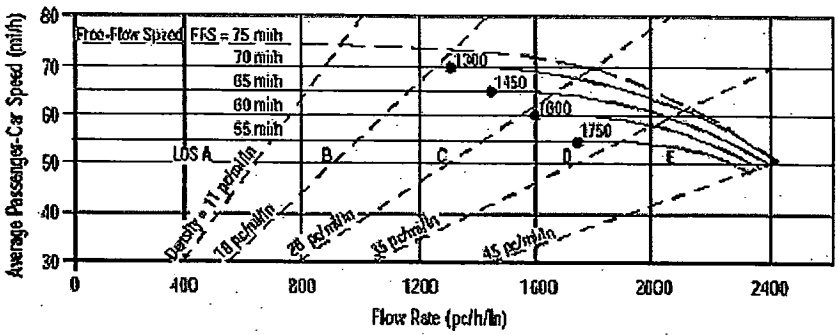
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2138*	pc/h/ln	Design LOS		
S	*61.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*34.6*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2008 Project AM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

. ☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*2975*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1817*	pc/h/ln
S	*67.7*	mi/h
D = v_p / S	*26.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

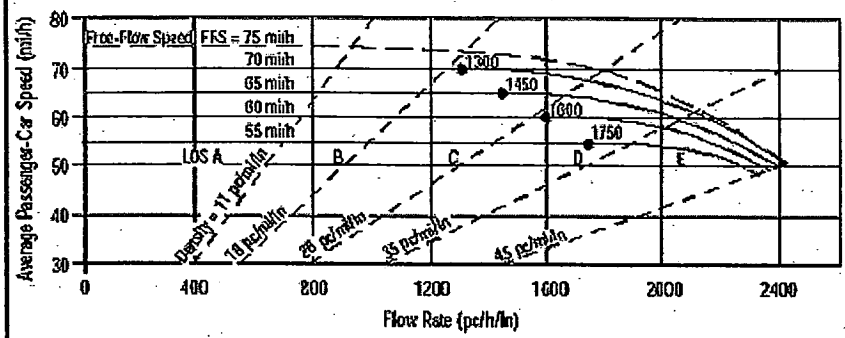
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3083*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

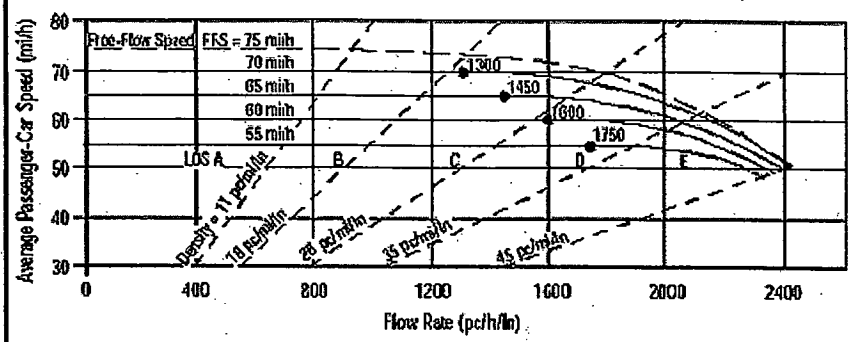
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1883*	pc/h/ln	Design LOS		
S	*66.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*28.2*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs				
Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

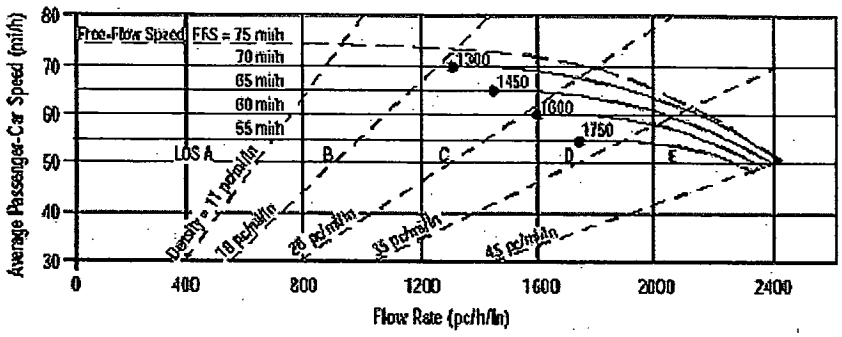
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1505*	pc/h/ln	Design LOS		
S	*69.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*21.6*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*4263*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

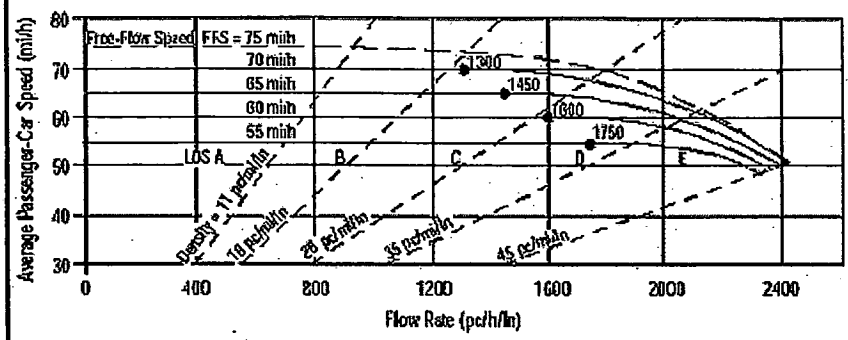
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) *2604*		pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☒ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*3460*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2114*	pc/h/ln	Design LOS		
S	*62.4*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*33.9*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary

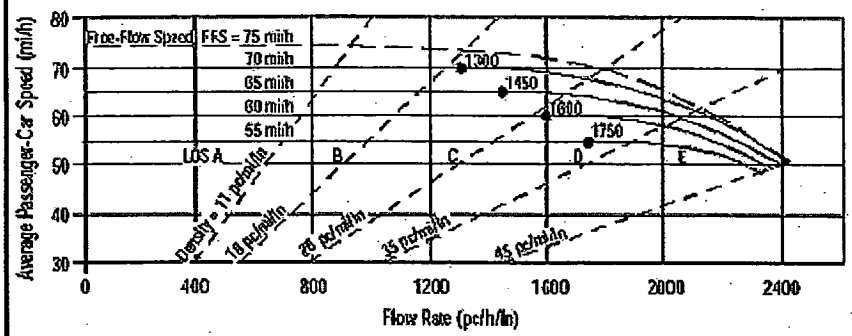
N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4263*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

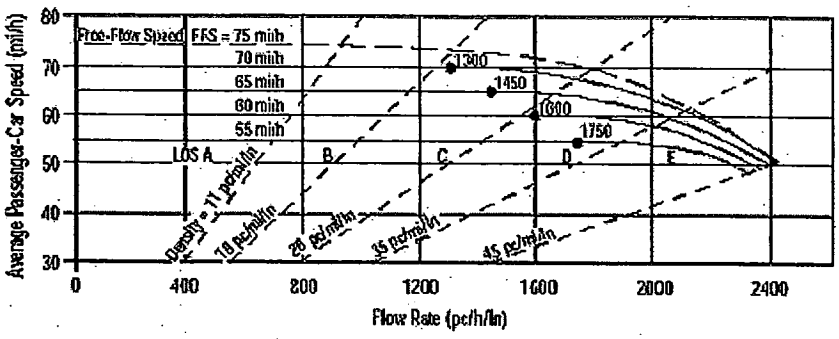
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2604*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2008 Project AM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2749*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1679*	pc/h/ln
S	*69.0*	mi/h
D = v_p / S	*24.3*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

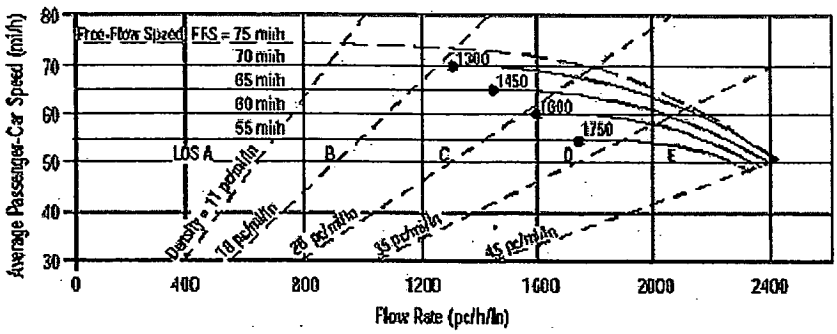
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2008 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4855*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2966*	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 15

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

INTERSECTION LEVEL OF SERVICE CALCULATIONS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18-1/2 | North/South Street: 99 SB offramp / Road 23

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		355	67	33	256	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	403	76	37	290	0
Percent Heavy Vehicles	0	--	--	29	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	66		139	12	123	66
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	75	0	157	13	139	75
Percent Heavy Vehicles	20	0	20	37	37	37
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		37	75		157		227	
C (m) (veh/h)		956	115		580		307	
v/c		0.04	0.65		0.27		0.74	
95% queue length		0.12	3.36		1.09		5.49	
Control Delay (s/veh)		8.9	81.8		13.5		43.8	
LOS		A	F		B		E	
Approach Delay (s/veh)	--	--	35.6			43.8		
Approach LOS	--	--	E			E		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/29/2006 5:40 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 18.5 @ 99SB offramp /Rd 23
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18-1/2 | North/South Street: 99 SB offramp / Road 23

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		372	76	51	288	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	422	86	57	327	0
Percent Heavy Vehicles	0	–	–	22	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	65		229	36	192	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	73	0	260	40	218	144
Percent Heavy Vehicles	20	0	20	45	45	45
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	1	0
Configuration	L		R		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	L		R		LTR	
v (veh/h)		57	73		260		402	
C (m) (veh/h)		962	0		562		231	
v/c		0.06			0.46		1.74	
95% queue length		0.19			2.43		26.97	
Control Delay (s/veh)		9.0			16.8		387.0	
LOS		A	F		C		F	
Approach Delay (s/veh)	–	–				387.0		
Approach LOS	–	–				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	204	59			95	24
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	231	67	0	0	107	27
Percent Heavy Vehicles	48	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	242	0	22			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	275	0	25	0	0	0
Percent Heavy Vehicles	35	35	35	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	231			300				
C (m) (veh/h)	1211			330				
v/c	0.19			0.91				
95% queue length	0.70			8.90				
Control Delay (s/veh)	8.7			65.3				
LOS	A			F				
Approach Delay (s/veh)	–	–	65.3					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18.5 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18-1/2	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	278	97			130	10
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	315	110	0	0	147	11
Percent Heavy Vehicles	19	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	285	0	46			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	323	0	52	0	0	0
Percent Heavy Vehicles	20	20	20	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LTR				
v (veh/h)	315			375				
C (m) (veh/h)	1324			248				
v/c	0.24			1.51				
95% queue length	0.93			22.21				
Control Delay (s/veh)	8.6			286.9				
LOS	A			F				
Approach Delay (s/veh)	–	–	286.9					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/29/2006 5:39 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 17	North/South Street: SR 99 SB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		755			948	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	857	0	0	1077	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				135		62
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	153	0	70
Percent Heavy Vehicles	0	0	0	6	0	6
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						153		70
C (m) (veh/h)						71		261
v/c						2.15		0.27
95% queue length						14.27		1.05
Control Delay (s/veh)						657.2		23.8
LOS						F		C
Approach Delay (s/veh)	--	--				458.3		
Approach LOS	--	--				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 SB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 17	North/South Street: SR 99 SB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1757			1597	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	1996	0	0	1814	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				282		74
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	320	0	84
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		R
v (veh/h)						320		84
C (m) (veh/h)						4		94
v/c						80.00		0.89
95% queue length						42.33		5.02
Control Delay (s/veh)						37344		145.7
LOS						F		F
Approach Delay (s/veh)	--	--				29610		
Approach LOS	--	--				F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	42	306			786	64
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	47	347	0	0	893	72
Percent Heavy Vehicles	3	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	612	36	271			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	695	40	307	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	47		735		307			
C (m) (veh/h)	710		149		696			
v/c	0.07		4.93		0.44			
95% queue length	0.21		76.84		2.26			
Control Delay (s/veh)	10.4		1829		14.2			
LOS	B		F		B			
Approach Delay (s/veh)	--	--	1294					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ 99 NB ramps
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 17	North/South Street: SR 99 NB ramps
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	57	865			1322	194
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	64	982	0	0	1502	220
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	947	0	1011			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	1076	0	1148	0	0	0
Percent Heavy Vehicles	2	2	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	0	0	0
Configuration	LT		R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT		R			
v (veh/h)	64		1076		1148			
C (m) (veh/h)	367		19		302			
v/c	0.17		56.63		3.80			
95% queue length	0.62		135.11		109.68			
Control Delay (s/veh)	16.9		25420		1293			
LOS	C		F		F			
Approach Delay (s/veh)	--	--	12966					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	SR 99 SB ramps @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt C
East/West Street: SR 99 SB ramps	North/South Street: Golden State Blvd
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		89	125	209	25	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	72	0	243
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				64		214
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	237	28	0	0	101	142
Percent Heavy Vehicles	0	0	0	11	0	11
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		237		315				
C (m) (veh/h)		1289		625				
v/c		0.18		0.50				
95% queue length		0.67		2.84				
Control Delay (s/veh)		8.4		16.5				
LOS		A		C				
Approach Delay (s/veh)	--	--	16.5					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	SR 99 SB ramps @ Golden State
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: SR 99 SB ramps | North/South Street: Golden State Blvd

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		143	152	246	35	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	194	0	710
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				171		625
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	279	39	0	0	162	172
Percent Heavy Vehicles	0	0	0	5	0	5
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		279		904				
C (m) (veh/h)		1182		538				
v/c		0.24		1.68				
95% queue length		0.92		52.24				
Control Delay (s/veh)		9.0		333.5				
LOS		A		F				
Approach Delay (s/veh)	--	--	333.5					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.986			0.852				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		8			313				24
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	180	249	24	83	292	29	70	5	288	62	5	22
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	196	271	26	90	317	32	76	5	313	67	5	24
Lane Group Flow (vph)	196	271	26	90	349	0	76	318	0	67	5	24
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	14.0	25.2	25.2	10.2	21.4	0.0	9.0	20.8	0.0	8.8	20.6	20.6
Total Split (%)	21.5%	38.8%	38.8%	15.7%	32.9%	0.0%	13.8%	32.0%	0.0%	13.5%	31.7%	31.7%
Maximum Green (s)	9.4	20.6	20.6	5.6	16.8		4.4	16.2		4.2	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	9.9	33.0	33.0	6.2	27.3		5.1	10.6		4.9	8.7	8.7
Actuated g/C Ratio	0.15	0.51	0.51	0.10	0.42		0.08	0.16		0.08	0.13	0.13
v/c Ratio	0.79	0.31	0.03	0.56	0.47		0.60	0.64		0.52	0.02	0.11
Control Delay	51.2	13.6	6.0	37.5	15.3		51.4	9.9		44.9	21.6	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	51.2	13.6	6.0	37.5	15.3		51.4	9.9		44.9	21.6	10.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	B	A	D	B		D	A		D	C	B
Approach Delay		28.1			19.9			17.9			35.1	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	76	61	0	37	74		30	2		26	2	0
Queue Length 95th (ft)	#173	143	14	m54	m187		#87	58		#73	9	16
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	252	876	757	162	746		127	606		130	462	411
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.78	0.31	0.03	0.56	0.47		0.60	0.52		0.52	0.01	0.06

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 23.2 Intersection LOS: C
Intersection Capacity Utilization 62.0% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.920				0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1681	0	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1681	0	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					153				89			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	104	495	0	0	249	367	155	4	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	118	562	0	0	283	417	176	5	89	0	0	0
Lane Group Flow (vph)	118	562	0	0	700	0	0	181	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	10.0	44.4	0.0	0.0	34.4	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	15.4%	68.3%	0.0%	0.0%	52.9%	0.0%	31.7%	31.7%	31.7%	0.0%	0.0%	0.0%
Maximum Green (s)	5.4	39.8			29.8		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	6.0	44.4			36.4			12.6	12.6			
Actuated g/C Ratio	0.09	0.68			0.56			0.19	0.19			
v/c Ratio	0.73	0.45			0.69			0.58	0.25			
Control Delay	50.5	4.3			14.7			30.8	7.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	50.5	4.3			14.7			30.8	7.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B			C	A			
Approach Delay		12.3			14.7			23.0				
Approach LOS		B			B			C				
Queue Length 50th (ft)	47	49			151			65	0			
Queue Length 95th (ft)	m#101	72			#360			110	29			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	162	1262			1010			413	435			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.73	0.45			0.69			0.44	0.20			

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 54 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 15.1 Intersection LOS: B
Intersection Capacity Utilization 60.2% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		1	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1785	0	1687	1776	1509	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		2				313			36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	276	418	14	101	344	10	149	9	288	175	9	33
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	300	454	15	110	374	11	162	10	313	190	10	36
Lane Group Flow (vph)	300	454	15	110	385	0	162	10	313	190	10	36
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Detector Phases	7	4	4	3	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	24.0	39.4	39.4	13.0	28.4	0.0	16.2	20.6	20.6	17.0	21.4	21.4
Total Split (%)	26.7%	43.8%	43.8%	14.4%	31.6%	0.0%	18.0%	22.9%	22.9%	18.9%	23.8%	23.8%
Maximum Green (s)	19.4	34.8	34.8	8.4	23.8		11.6	16.0	16.0	12.4	16.8	16.8
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	19.7	43.6	43.6	8.7	32.6		11.7	9.1	9.1	12.6	10.0	10.0
Actuated g/C Ratio	0.22	0.48	0.48	0.10	0.36		0.13	0.10	0.10	0.14	0.11	0.11
v/c Ratio	0.81	0.53	0.02	0.67	0.59		0.74	0.06	0.72	0.81	0.05	0.18
Control Delay	52.0	20.2	7.6	59.9	29.7		58.8	34.1	14.5	63.5	33.2	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	20.2	7.6	59.9	29.7		58.8	34.1	14.5	63.5	33.2	13.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	E	C		E	C	B	E	C	B
Approach Delay		32.4			36.4			29.7			54.6	
Approach LOS		C			D			C			D	
Queue Length 50th (ft)	162	163	0	61	168		89	5	0	106	5	0
Queue Length 95th (ft)	#292	311	12	#134	#341		#180	19	71	#213	19	25
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	375	861	739	170	648		229	328	534	244	343	321
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.53	0.02	0.65	0.59		0.71	0.03	0.59	0.78	0.03	0.11

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 35.4 Intersection LOS: D
Intersection Capacity Utilization 60.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

ø1	ø2	ø4	ø3
17 s	20.6 s	39.4 s	13 s

ø5	ø6	ø8	ø7
16.2 s	21.4 s	28.4 s	24 s

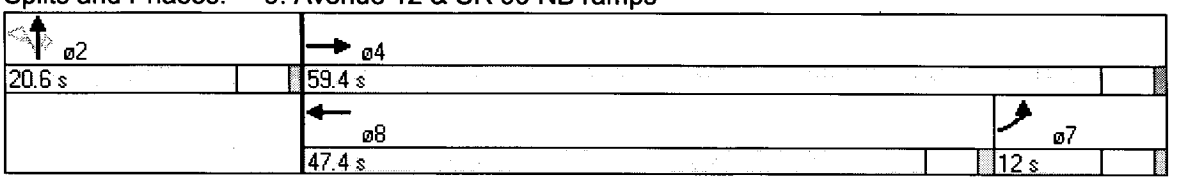
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.915				0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1656	0	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1656	0	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					167				149			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	114	767	0	0	280	476	174	1	131	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	130	872	0	0	318	541	198	1	149	0	0	0
Lane Group Flow (vph)	130	872	0	0	859	0	0	199	149	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6		20.6	20.6	20.6			
Total Split (s)	12.0	59.4	0.0	0.0	47.4	0.0	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	15.0%	74.3%	0.0%	0.0%	59.3%	0.0%	25.8%	25.8%	25.8%	0.0%	0.0%	0.0%
Maximum Green (s)	7.4	54.8			42.8		16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	8.0	57.9			45.9			14.1	14.1			
Actuated g/C Ratio	0.10	0.72			0.57			0.18	0.18			
v/c Ratio	0.76	0.67			0.84			0.68	0.39			
Control Delay	63.6	9.6			21.6			42.7	8.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	63.6	9.6			21.6			42.7	8.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			C			D	A			
Approach Delay		16.6			21.6			27.9				
Approach LOS		B			C			C				
Queue Length 50th (ft)	64	200			276			93	0			
Queue Length 95th (ft)	#147	326			#543			153	43			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	172	1310			1022			345	426			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.76	0.67			0.84			0.58	0.35			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 20.3 Intersection LOS: C
Intersection Capacity Utilization 69.9% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt C
East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	169	1	62	160	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	8	8	1	14	54
Percent Heavy Vehicles	11	--	--	19	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	8	8	1	13	50
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	67	173	2	16	183	1
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	67		69			19	
C (m) (veh/h)	1349	1295		706			533	
v/c	0.01	0.05		0.10			0.04	
95% queue length	0.04	0.16		0.32			0.11	
Control Delay (s/veh)	7.7	7.9		10.7			12.0	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	10.7			12.0		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	236	5	110	253	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	11	5	3	10	119
Percent Heavy Vehicles	13	--	--	15	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	11	5	3	10	110
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	119	274	1	15	256	5
Percent Heavy Vehicles	7	7	7	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	15	119		132			17	
C (m) (veh/h)	1227	1232		660			325	
v/c	0.01	0.10		0.20			0.05	
95% queue length	0.04	0.32		0.74			0.16	
Control Delay (s/veh)	8.0	8.2		11.8			16.7	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	11.8			16.7		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 17	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	167	107	24	127	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	2	47	9	118	19	9
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	2	44	9	109	18	9
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	26	138	2	5	181	116
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	26		146			58	
C (m) (veh/h)	1443	1264		470			500	
v/c	0.00	0.02		0.31			0.12	
95% queue length	0.01	0.06		1.31			0.39	
Control Delay (s/veh)	7.5	7.9		16.1			13.1	
LOS	A	A		C			B	
Approach Delay (s/veh)	--	--	16.1			13.1		
Approach LOS	--	--	C			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 17	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	6	193	226	38	196	6
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	8	91	21	222	55	32
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	8	84	20	205	51	30
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	41	213	6	6	209	245
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	6	41		309			120	
C (m) (veh/h)	1350	1107		295			354	
v/c	0.00	0.04		1.05			0.34	
95% queue length	0.01	0.12		11.68			1.47	
Control Delay (s/veh)	7.7	8.4		104.5			20.3	
LOS	A	A		F			C	
Approach Delay (s/veh)	--	--	104.5			20.3		
Approach LOS	--	--	F			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*S. Leon*	Intersection	*Ave 17 @ Golden State Blvd*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*7/17/06*	Analysis Year	*2008*
Analysis Time Period	*2008 Project AM*		

Project Description *04-837.1 Northfork Casino Alt C*

East/West Street: *Avenue 17*	North/South Street: *Golden State Blvd*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	22	392	49	140	545	289
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	23	426	53	152	592	314
Percent Heavy Vehicles	2	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	61	30	104	236	28	18
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	66	32	113	256	30	19
Percent Heavy Vehicles	21	21	21	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	23	152	66		145		305	
C (m) (veh/h)	751	1073	39		186		31	
v/c	0.03	0.14	1.69		0.78		9.84	
95% queue length	0.09	0.49	6.94		5.24		37.32	
Control Delay (s/veh)	9.9	8.9	560.6		70.9		4224	
LOS	A	A	F		F		F	
Approach Delay (s/veh)	--	--	224.1			4224		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 17 @ Golden State Blvd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 17	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	38	875	84	212	819	576
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	41	951	91	230	890	626
Percent Heavy Vehicles	2	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	76	99	245	628	63	34
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	82	107	266	682	68	36
Percent Heavy Vehicles	4	4	4	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L		TR		LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	L		TR		LTR	
v (veh/h)	41	230	82		373		786	
C (m) (veh/h)	441	641			0			
v/c	0.09	0.36						
95% queue length	0.31	1.63						
Control Delay (s/veh)	14.0	13.7						
LOS	B	B			F			
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt C

East/West Street: Ellis | North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	28	3	12	16	0	105
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	27	657	10	83	361	16
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	46		131		385	367	285	213
% Heavy Vehicles	8		8		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.7		0.1		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.3		0.9		0.0	0.0	0.0	0.1
Prop. Heavy Vehicle	0.1		0.1		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	0.0	0.2	-0.0

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.04		0.12		0.34	0.33	0.25	0.19
hd, final value (s)	6.90		6.16		5.83	5.78	6.25	6.04
x, final value	0.09		0.22		0.62	0.59	0.49	0.36
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	4.9		4.2		3.5	3.5	4.0	3.7

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	296		381		610	616	535	463
Delay (s/veh)	10.56		10.93		17.71	16.41	14.92	12.05
LOS	B		B		C	C	B	B
Approach: Delay (s/veh)	10.56		10.93		17.07		13.69	
LOS	B		B		C		B	
Intersection Delay (s/veh)	15.12							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ellis @ Road 26
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt C

East/West Street: Ellis

North/South Street: Road 26

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	40	12	10	48	4	190
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	39	652	70	177	928	98
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LT	TR	LT	TR
PHF	0.92		0.92		0.92	0.92	0.92	0.92
Flow Rate (veh/h)	66		262		396	430	696	610
% Heavy Vehicles	2		2		2	2	2	2
No. Lanes	1		1		2		2	
Geometry Group	2		2		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.7		0.2		0.1	0.0	0.3	0.0
Prop. Right-Turns	0.2		0.8		0.0	0.2	0.0	0.2
Prop. Heavy Vehicle	0.0		0.0		0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		-0.4		0.1	-0.1	0.2	-0.1

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20	3.20	3.20	3.20
x, initial	0.06		0.23		0.35	0.38	0.62	0.54
hd, final value (s)	8.35		6.94		7.46	7.28	7.35	7.08
x, final value	0.15		0.51		0.82	0.87	1.42	1.20
Move-up time, m (s)	2.0		2.0		2.3		2.3	
Service Time, t_s (s)	6.3		4.9		5.2	5.0	5.0	4.8

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	316		512		483	495	696	610
Delay (s/veh)	12.85		16.82		35.97	41.47	221.48	131.23
LOS	B		C		E	E	F	F
Approach: Delay (s/veh)	12.85		16.82		38.83		179.33	
LOS	B		C		E		F	
Intersection Delay (s/veh)	110.38							
Intersection LOS	F							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	253	8	0	222	21
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	1	0	26	1	23
Percent Heavy Vehicles	8	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	1	0	24	1	22
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	241	22	0	274	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	0	0		50			1	
C (m) (veh/h)	1267	1236		538			452	
v/c	0.00	0.00		0.09			0.00	
95% queue length	0.00	0.00		0.31			0.01	
Control Delay (s/veh)	7.8	7.9		12.4			13.0	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	12.4			13.0		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description	04-837.1 Northfork Casino Alt C
East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	377	31	1	367	90
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	2	1	28	3	46
Percent Heavy Vehicles	17	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	2	1	26	3	43
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	398	97	1	409	33
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		77			3	
C (m) (veh/h)	996	1082		405			271	
v/c	0.00	0.00		0.19			0.01	
95% queue length	0.00	0.00		0.69			0.03	
Control Delay (s/veh)	8.6	8.3		16.0			18.4	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	16.0			18.4		
Approach LOS	--	--	C			C		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	12	125	29	10	115	44
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	127	15	29	85	41
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	179		181		173		167	
% Heavy Vehicles	5		11		20		15	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.1		0.1		0.1		0.2	
Prop. Right-Turns	0.2		0.3		0.1		0.3	
Prop. Heavy Vehicle	0.0		0.1		0.2		0.1	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		0.0		0.3		0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.16		0.16		0.15		0.15	
hd, final value (s)	5.12		5.16		5.44		5.28	
x, final value	0.25		0.26		0.26		0.24	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.1		3.2		3.4		3.3	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	429		431		423		417	
Delay (s/veh)	9.86		9.97		10.35		9.98	
LOS	A		A		B		A	
Approach: Delay (s/veh)	9.86		9.97		10.35		9.98	
LOS	A		A		B		A	
Intersection Delay (s/veh)	10.04							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 14 @ Road 23
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 14 | North/South Street: Road 23

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	33	95	46	19	160	94
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	222	20	75	231	48
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	187		295		317		384	
% Heavy Vehicles	8		4		6		16	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1		0.2		0.2	
Prop. Right-Turns	0.3		0.3		0.1		0.1	
Prop. Heavy Vehicle	0.1		0.0		0.1		0.2	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.0		-0.1		0.1		0.2	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.17		0.26		0.28		0.34	
hd, final value (s)	7.14		6.67		6.66		6.62	
x, final value	0.37		0.55		0.59		0.71	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	5.1		4.7		4.7		4.6	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	422		488		501		518	
Delay (s/veh)	14.28		17.42		18.65		23.99	
LOS	B		C		C		C	
Approach: Delay (s/veh)	14.28		17.42		18.65		23.99	
LOS	B		C		C		C	
Intersection Delay (s/veh)	19.38							
Intersection LOS	C							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 @ Schnoor
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 16	North/South Street: Schnoor
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	46	8	89	4	18	27
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	280	24	48	234	48	10
Percent Heavy Vehicles	2	--	--	36	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	258	23	45	216	45	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	4	19	29	49	8	96
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	49	4	234		58		352	
C (m) (veh/h)	1559	1300	699		748		700	
v/c	0.03	0.00	0.33		0.08		0.50	
95% queue length	0.10	0.01	1.47		0.25		2.85	
Control Delay (s/veh)	7.4	7.8	12.7		10.2		15.2	
LOS	A	A	B		B		C	
Approach Delay (s/veh)	--	--	12.2			15.2		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 @ Schnoor
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 16	North/South Street: Schnoor
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	86	15	217	8	27	38
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	351	46	122	565	91	27
Percent Heavy Vehicles	13	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	1	0	1	0
Configuration	L	T	R	LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	323	43	113	520	84	25
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	8	29	41	93	16	235
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration		LTR		L		TR

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LTR	L		TR		LTR	
v (veh/h)	93	8	565		118		519	
C (m) (veh/h)	1464	1314	463		646		495	
v/c	0.06	0.01	1.22		0.18		1.05	
95% queue length	0.20	0.02	22.27		0.66		15.53	
Control Delay (s/veh)	7.6	7.8	144.4		11.8		82.8	
LOS	A	A	F		B		F	
Approach Delay (s/veh)	--	--	121.5			82.8		
Approach LOS	--	--	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2008

Project ID 04-837.1 Nortfork Casino Alt C

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	130	380	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	239	0	6	2	110	202
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	141	413			259	6	121	219
% Heavy Vehicles	3	3			14	14	6	6
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.1	0.1	0.1	0.1
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.5			0.7	-0.5	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.13	0.37			0.23	0.01	0.11	0.19
hd, final value (s)	5.66	5.06			7.18	5.96	6.52	5.80
x, final value	0.22	0.58			0.52	0.01	0.22	0.35
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	3.7	3.1			4.9	3.7	4.2	3.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	391	663			484	256	371	469
Delay (s/veh)	10.27	14.82			17.29	8.72	11.04	11.62
LOS	B	B			C	A	B	B
Approach: Delay (s/veh)	13.66				17.10		11.41	
LOS	B				C		B	
Intersection Delay (s/veh)	13.79							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Ave 16 @ 99 SB ramps
Jurisdiction	Caltrans
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt C

East/West Street: Ave 16 / 99 SB on-ramp

North/South Street: 99SB off-ramp / Ave 16

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	285	679	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	524	0	10	3	198	475
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	T	R			L	R	LT	R
PHF	0.92	0.92			0.92	0.92	0.92	0.92
Flow Rate (veh/h)	309	738			569	10	218	516
% Heavy Vehicles	2	2			2	2	4	4
No. Lanes	2		0		2		2	
Geometry Group	1				5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0	0.0			1.0	0.0	0.0	0.0
Prop. Right-Turns	0.0	1.0			0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0			0.0	0.0	0.0	0.0
hLT-adj	0.2	0.2			0.5	0.5	0.5	0.5
hRT-adj	-0.6	-0.6			-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7			1.7	1.7	1.7	1.7
hadj, computed	0.0	-0.6			0.5	-0.7	0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20			3.20	3.20	3.20	3.20
x, initial	0.27	0.66			0.51	0.01	0.19	0.46
hd, final value (s)	7.07	6.46			8.78	7.54	7.94	7.20
x, final value	0.61	1.32			1.39	0.02	0.48	1.03
Move-up time, m (s)	2.0				2.3		2.3	
Service Time, t_s (s)	5.1	4.5			6.5	5.2	5.6	4.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	510	738			569	260	454	516
Delay (s/veh)	20.38	178.00			213.22	10.40	17.76	75.53
LOS	C	F			F	B	C	F
Approach: Delay (s/veh)	131.48				209.72		58.37	
LOS	F				F		F	
Intersection Delay (s/veh)	127.94							
Intersection LOS	F							

Copyright © 2005 University of Florida, All Rights Reserved

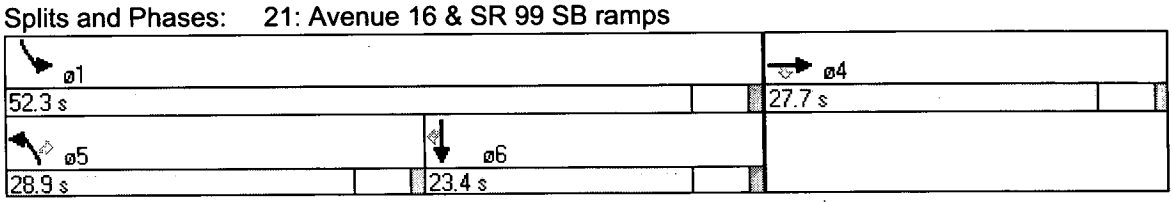
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1845	1568	0	0	0	1583	0	1417	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			413						7	2		220
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	130	380	0	0	0	239	0	6	2	110	202
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
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	14%	14%	14%	6%	6%	6%
Adj. Flow (vph)	0	141	413	0	0	0	260	0	7	2	120	220
Lane Group Flow (vph)	0	141	413	0	0	0	260	0	7	2	120	220
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	27.7	27.7	0.0	0.0	0.0	28.9	0.0	28.9	52.3	23.4	23.4
Total Split (%)	0.0%	34.6%	34.6%	0.0%	0.0%	0.0%	36.1%	0.0%	36.1%	65.4%	29.3%	29.3%
Maximum Green (s)		22.8	22.8				24.0		24.0	47.4	18.5	18.5
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		23.7	23.7				24.9		24.9	15.7	19.4	19.4
Actuated g/C Ratio		0.30	0.30				0.31		0.31	0.18	0.24	0.24
v/c Ratio		0.26	0.55				0.53		0.02	0.01	0.28	0.41
Control Delay		23.0	5.6				27.4		11.7	12.0	26.7	6.4
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		23.0	5.6				27.4		11.7	12.0	26.7	6.4
LOS		C	A				C		B	B	C	A
Approach Delay		10.0									13.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B									B	
Queue Length 50th (ft)		53	0				106		0	0	49	0
Queue Length 95th (ft)		99	62				179		9	3	94	52
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		547	755				493		446	704	435	536
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.26	0.55				0.53		0.02	0.00	0.28	0.41

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 14.9 Intersection LOS: B
Intersection Capacity Utilization 36.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



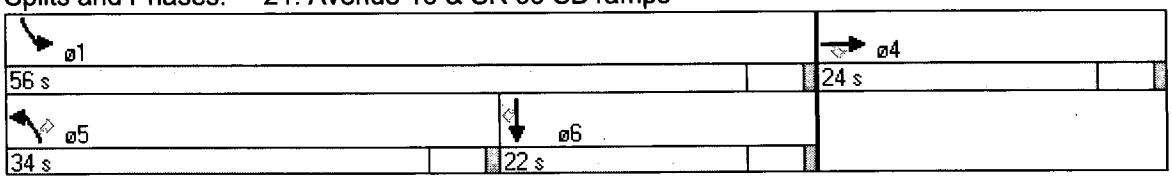
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	0	0	1770	0	1583	1736	1827	1553
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			738						11	3		516
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		286			228			443			580	
Travel Time (s)		4.9			5.2			7.6			13.2	
Volume (vph)	0	285	679	0	0	0	524	0	10	3	198	475
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	310	738	0	0	0	570	0	11	3	215	516
Lane Group Flow (vph)	0	310	738	0	0	0	570	0	11	3	215	516
Turn Type			Perm				Prot		custom	Prot		Perm
Protected Phases		4					5			1	6	
Permitted Phases			4						5			6
Detector Phases		4	4				5		5	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				20.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	24.0	24.0	0.0	0.0	0.0	34.0	0.0	34.0	56.0	22.0	22.0
Total Split (%)	0.0%	30.0%	30.0%	0.0%	0.0%	0.0%	42.5%	0.0%	42.5%	70.0%	27.5%	27.5%
Maximum Green (s)		19.1	19.1				29.1		29.1	51.1	17.1	17.1
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lead		Lead		Lag	Lag
Lead-Lag Optimize?							Yes		Yes		Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		Max	Max				Max		Max	None	Max	Max
Walk Time (s)		5.0	5.0				5.0		5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0				11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0				0		0		0	0
Act Effct Green (s)		20.0	20.0				30.0		30.0	16.5	18.0	18.0
Actuated g/C Ratio		0.25	0.25				0.38		0.38	0.19	0.22	0.22
v/c Ratio		0.67	0.78				0.86		0.02	0.01	0.52	0.69
Control Delay		35.0	9.0				38.2		8.8	10.3	32.6	8.2
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		35.0	9.0				38.2		8.8	10.3	32.6	8.2
LOS		D	A				D		A	B	C	A
Approach Delay		16.7									15.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B									B	
Queue Length 50th (ft)		139	0				257		0	0	95	0
Queue Length 95th (ft)		225	105				#442		10	3	162	83
Internal Link Dist (ft)		206			148			363			500	
Turn Bay Length (ft)												
Base Capacity (vph)		466	949				664		601	759	411	749
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.67	0.78				0.86		0.02	0.00	0.52	0.69

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 65.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	SR 99 NB ramps at Avenue 16
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 16 connector | North/South Street: SR 99 NB ramps

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		143			6	133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	303	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	279					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	6	144	0	155	0
Percent Heavy Vehicles	3	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						303		
C (m) (veh/h)						753		
v/c						0.40		
95% queue length						1.95		
Control Delay (s/veh)						13.0		
LOS						B		
Approach Delay (s/veh)	--	--				13.0		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	SR 99 NB ramps at Avenue 16
Agency/Co.	TPG Consulting, Inc	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description	04-837.1 Northfork Casino Alt C
East/West Street: Avenue 16 connector	North/South Street: SR 99 NB ramps
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		221			10	299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	486	0	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	448					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	10	324	0	240	0
Percent Heavy Vehicles	2	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	0	0	0	0
Configuration	L					

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration						L		
v (veh/h)						486		
C (m) (veh/h)						596		
v/c						0.82		
95% queue length						8.27		
Control Delay (s/veh)						32.3		
LOS						D		
Approach Delay (s/veh)	--	--				32.3		
Approach LOS	--	--				D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 16 connector	North/South Street: Avenue 16
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		112		279	211	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	144
Percent Heavy Vehicles	0	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						133
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	303	229	0	0	121	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		303			144			
C (m) (veh/h)		1430			930			
v/c		0.21			0.15			
95% queue length		0.80			0.55			
Control Delay (s/veh)		8.2			9.6			
LOS		A			A			
Approach Delay (s/veh)	--	--	9.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 16 at Ave 16 connector
Agency/Co.	TPG Consulting, Inc.	Jurisdiction	Caltrans
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: Avenue 16 connector | North/South Street: Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235		448	429	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	324
Percent Heavy Vehicles	0	--	--	10	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T		LT		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						299
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	486	466	0	0	255	0
Percent Heavy Vehicles	0	0	0	0	0	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT			R			
v (veh/h)		486			324			
C (m) (veh/h)		1265			784			
v/c		0.38			0.41			
95% queue length		1.84			2.04			
Control Delay (s/veh)		9.6			12.8			
LOS		A			B			
Approach Delay (s/veh)	--	--	12.8					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/17/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		112	143		211	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	6	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				6		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	229	0	0	121	155
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			6					
C (m) (veh/h)			584					
v/c			0.01					
95% queue length			0.03					
Control Delay (s/veh)			11.2					
LOS			B					
Approach Delay (s/veh)	--	--	11.2					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting, Inc.
Date Performed	7/17/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Gateway/Ave 16 at SR 99 NB
Jurisdiction	Caltrans
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt C

East/West Street: SR 99 NB ramps | North/South Street: Gateway/Avenue 16

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		235	221		429	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR		T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	0	466	0	0	255	240
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	0
Configuration				L		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L					
v (veh/h)			10					
C (m) (veh/h)			335					
v/c			0.03					
95% queue length			0.09					
Control Delay (s/veh)			16.1					
LOS			C					
Approach Delay (s/veh)	--	--	16.1					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

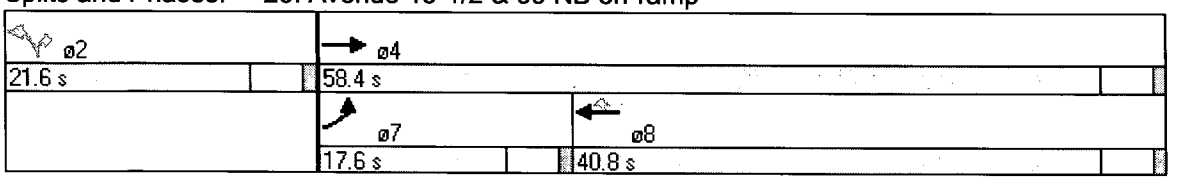
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						199			200			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	123	715	0	0	1025	183	344	0	184	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	134	777	0	0	1114	199	374	0	200	0	0	0
Lane Group Flow (vph)	134	777	0	0	1114	199	374	0	200	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	17.6	58.4	0.0	0.0	40.8	40.8	21.6	0.0	21.6	0.0	0.0	0.0
Total Split (%)	22.0%	73.0%	0.0%	0.0%	51.0%	51.0%	27.0%	0.0%	27.0%	0.0%	0.0%	0.0%
Maximum Green (s)	13.0	53.8			36.2	36.2	17.0		17.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	11.5	57.3			41.8	41.8	14.7		14.7			
Actuated g/C Ratio	0.14	0.72			0.52	0.52	0.18		0.18			
v/c Ratio	0.53	0.31			0.61	0.22	0.63		0.46			
Control Delay	51.3	0.4			16.3	2.7	34.7		8.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	51.3	0.4			16.3	2.7	34.7		8.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B	A	C		A			
Approach Delay		7.9			14.3							
Approach LOS		A			B							
Queue Length 50th (ft)	74	1			196	0	89		0			
Queue Length 95th (ft)	m115	1			294	34	127		51			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	302	2535			1815	907	713		485			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.44	0.31			0.61	0.22	0.52		0.41			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 26 (33%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 61.6% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	1		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						300			26			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	242	1786	0	0	1679	354	699	0	311	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	263	1941	0	0	1825	385	760	0	338	0	0	0
Lane Group Flow (vph)	263	1941	0	0	1825	385	760	0	338	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	20.5	81.6	0.0	0.0	61.1	61.1	28.4	0.0	28.4	0.0	0.0	0.0
Total Split (%)	18.6%	74.2%	0.0%	0.0%	55.5%	55.5%	25.8%	0.0%	25.8%	0.0%	0.0%	0.0%
Maximum Green (s)	15.9	77.0			56.5	56.5	23.8		23.8			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	16.5	77.6			57.1	57.1	24.4		24.4			
Actuated g/C Ratio	0.15	0.71			0.52	0.52	0.22		0.22			
v/c Ratio	0.99	0.78			0.99	0.40	1.01		0.92			
Control Delay	74.6	1.9			46.4	4.9	77.9		69.9			
Queue Delay	0.0	2.1			2.4	0.0	0.0		0.0			
Total Delay	74.6	4.0			48.8	4.9	77.9		69.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			D	A	E		E			
Approach Delay		12.5			41.1							
Approach LOS		B			D							
Queue Length 50th (ft)	195	78			646	29	~281		219			
Queue Length 95th (ft)	m189	m75			#841	85	#409		#394			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	266	2497			1837	966	754		368			
Starvation Cap Reductn	0	397			0	0	0		0			
Spillback Cap Reductn	0	0			19	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.99	0.92			1.00	0.40	1.01		0.92			

Intersection Summary

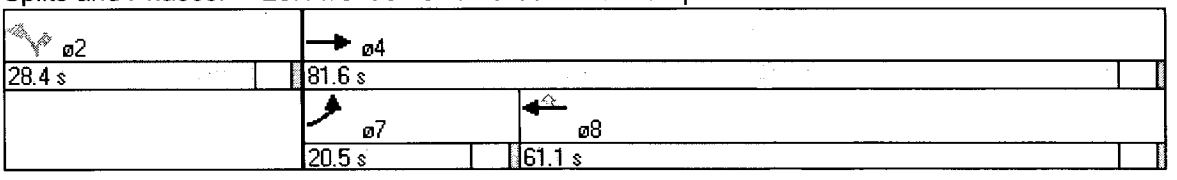
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 11 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 36.5 Intersection LOS: D
Intersection Capacity Utilization 133.5% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



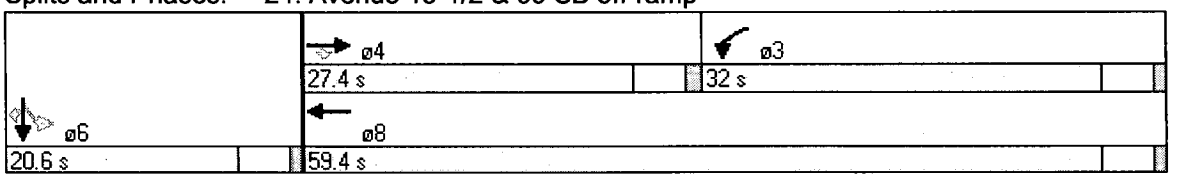
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			385									95
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	670	354	361	1008	0	0	0	0	173	1	87
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	728	385	392	1096	0	0	0	0	188	1	95
Lane Group Flow (vph)	0	728	385	392	1096	0	0	0	0	0	189	95
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	27.4	27.4	32.0	59.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	34.3%	34.3%	40.0%	74.3%	0.0%	0.0%	0.0%	0.0%	25.8%	25.8%	25.8%
Maximum Green (s)		22.8	22.8	27.4	54.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		26.4	26.4	28.0	58.4						13.6	13.6
Actuated g/C Ratio		0.33	0.33	0.35	0.73						0.17	0.17
v/c Ratio		0.62	0.49	0.64	0.43						0.63	0.27
Control Delay		26.1	5.0	20.3	0.7						39.9	8.5
Queue Delay		0.0	0.0	0.1	0.2						0.0	0.0
Total Delay		26.1	5.0	20.5	0.9						39.9	8.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A						D	A
Approach Delay		18.8			6.1						29.4	
Approach LOS		B			A						C	
Queue Length 50th (ft)		161	0	155	2						88	0
Queue Length 95th (ft)		231	61	233	6						148	37
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1169	780	608	2535						368	404
Starvation Cap Reductn		0	0	11	514						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.62	0.49	0.66	0.54						0.51	0.24

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 32 (40%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 13.3 Intersection LOS: B
Intersection Capacity Utilization 61.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.952	
Satd. Flow (prot)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Flt Permitted				0.950							0.952	
Satd. Flow (perm)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			473									12
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1601	575	296	2082	0	0	0	0	413	1	203
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1740	625	322	2263	0	0	0	0	449	1	221
Lane Group Flow (vph)	0	1740	625	322	2263	0	0	0	0	0	450	221
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	56.9	56.9	23.0	79.9	0.0	0.0	0.0	0.0	30.1	30.1	30.1
Total Split (%)	0.0%	51.7%	51.7%	20.9%	72.6%	0.0%	0.0%	0.0%	0.0%	27.4%	27.4%	27.4%
Maximum Green (s)		52.3	52.3	18.4	75.3					25.5	25.5	25.5
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		52.9	52.9	19.0	75.9						26.1	26.1
Actuated g/C Ratio		0.48	0.48	0.17	0.69						0.24	0.24
v/c Ratio		1.02	0.62	1.05	0.93						1.07	0.57
Control Delay		56.7	7.7	79.1	11.8						104.4	41.8
Queue Delay		0.0	0.0	0.0	11.0						0.0	0.0
Total Delay		56.7	7.7	79.1	22.7						104.4	41.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A	E	C						F	D
Approach Delay		43.7			29.7						83.7	
Approach LOS		D			C						F	
Queue Length 50th (ft)		~688	60	~247	268						~353	131
Queue Length 95th (ft)		#828	171	m#248	m270						#552	212
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1702	1007	306	2442						421	385
Starvation Cap Reductn		0	0	0	206						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		1.02	0.62	1.05	1.01						1.07	0.57

Intersection Summary

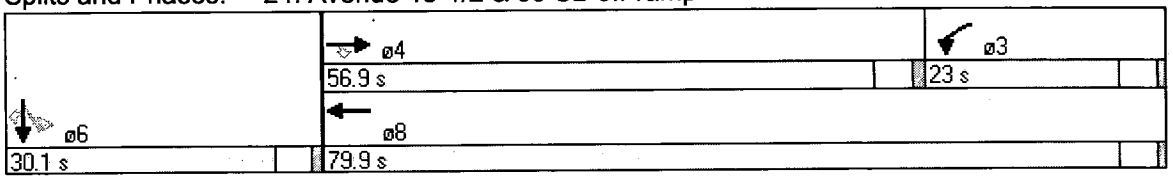
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 42.1 Intersection LOS: D
Intersection Capacity Utilization 133.5% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



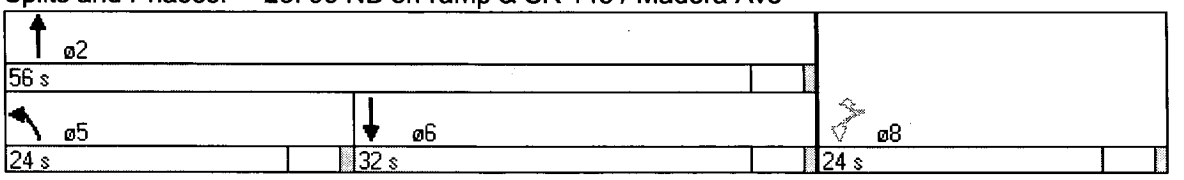
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.902	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1680	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46					186	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	377	0	42	379	502	0	0	165	443
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	410	0	46	412	546	0	0	179	482
Lane Group Flow (vph)	0	0	0	410	0	46	412	546	0	0	661	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	24.0	0.0	24.0	24.0	56.0	0.0	0.0	32.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	30.0%	0.0%	30.0%	30.0%	70.0%	0.0%	0.0%	40.0%	0.0%
Maximum Green (s)				19.4		19.4	19.4	51.4			27.4	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				19.9		19.9	20.0	52.1			28.1	
Actuated g/C Ratio				0.25		0.25	0.25	0.65			0.35	
v/c Ratio				0.93		0.11	0.93	0.45			0.93	
Control Delay				60.0		8.4	52.6	10.0			40.4	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				60.0		8.4	52.6	10.0			40.4	
LOS				E		A	D	B			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								28.3			40.4	
Approach LOS								C			D	
Queue Length 50th (ft)				200		0	211	181			238	
Queue Length 95th (ft)				#368		25	#367	203			#461	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				443		430	443	1213			710	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.93		0.11	0.93	0.45			0.93	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 26 (33%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 38.0 Intersection LOS: D
Intersection Capacity Utilization 87.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
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
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.915	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1583	1770	1863	0	0	1704	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	1770	0	1583	1770	1863	0	0	1704	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41					100	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	250	0	38	612	685	0	0	260	447
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	272	0	41	665	745	0	0	283	486
Lane Group Flow (vph)	0	0	0	272	0	41	665	745	0	0	769	0
Turn Type				custom		custom	Prot					
Protected Phases							5	2			6	
Permitted Phases				8		8						
Detector Phases				8		8	5	2			6	
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	37.0	79.4	0.0	0.0	42.4	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.6%	0.0%	20.6%	37.0%	79.4%	0.0%	0.0%	42.4%	0.0%
Maximum Green (s)				16.0		16.0	32.4	74.8			37.8	
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Recall Mode				None		None	None	C-Min			C-Min	
Walk Time (s)				5.0		5.0		5.0			5.0	
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	
Pedestrian Calls (#/hr)				0		0		0			0	
Act Effct Green (s)				16.6		16.6	33.0	75.4			38.4	
Actuated g/C Ratio				0.17		0.17	0.33	0.75			0.38	
v/c Ratio				0.93		0.14	1.14	0.53			1.07	
Control Delay				79.0		12.5	103.0	7.4			82.9	
Queue Delay				0.0		0.0	0.0	1.4			0.0	
Total Delay				79.0		12.5	103.0	8.8			82.9	
LOS				E		B	F	A			F	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								53.2			82.9	
Approach LOS								D			F	
Queue Length 50th (ft)				173		0	~504	218			~507	
Queue Length 95th (ft)				#327		30	m#545	m237			#739	
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				294		297	584	1405			716	
Starvation Cap Reductn				0		0	0	438			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.93		0.14	1.14	0.77			1.07	

Intersection Summary

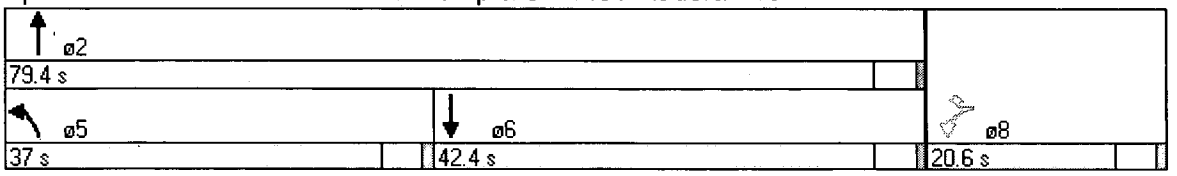
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 79 (79%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 64.5 Intersection LOS: E
Intersection Capacity Utilization 98.9% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



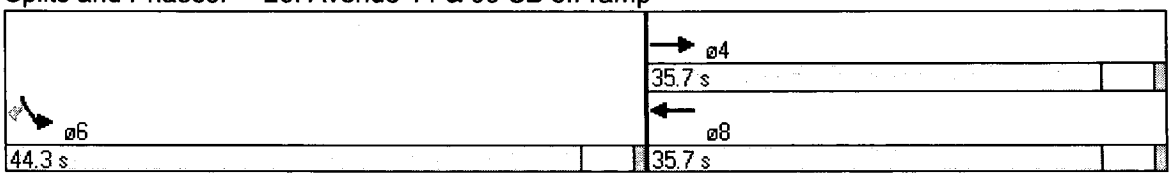
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						246
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	433	417	0	499	302
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	471	453	0	542	328
Lane Group Flow (vph)	0	471	453	0	542	328
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	35.7	35.7	0.0	44.3	44.3
Total Split (%)	0.0%	44.6%	44.6%	0.0%	55.4%	55.4%
Maximum Green (s)		31.1	31.1		39.7	39.7
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		42.1	42.1		29.9	29.9
Actuated g/C Ratio		0.53	0.53		0.37	0.37
v/c Ratio		0.25	0.46		0.83	0.44
Control Delay		12.4	5.5		33.3	6.0
Queue Delay		0.1	0.5		0.5	0.0
Total Delay		12.5	5.9		33.7	6.0
LOS		B	A		C	A
Approach Delay		12.5	5.9		23.3	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		C	
Queue Length 50th (ft)		64	16		239	26
Queue Length 95th (ft)		120	103		286	63
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1863	981		883	912
Starvation Cap Reductn		0	202		0	0
Spillback Cap Reductn		557	0		85	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.36	0.58		0.68	0.36

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 60 (75%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 16.1 Intersection LOS: B
Intersection Capacity Utilization 56.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



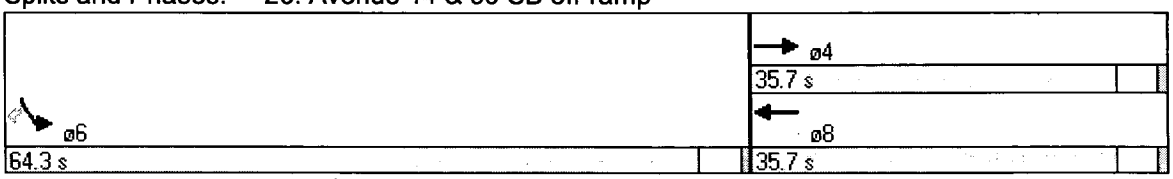
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						204
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	563	314	0	662	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	612	341	0	720	204
Lane Group Flow (vph)	0	612	341	0	720	204
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	35.7	35.7	0.0	64.3	64.3
Total Split (%)	0.0%	35.7%	35.7%	0.0%	64.3%	64.3%
Maximum Green (s)		31.1	31.1		59.7	59.7
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		47.1	47.1		44.9	44.9
Actuated g/C Ratio		0.47	0.47		0.45	0.45
v/c Ratio		0.37	0.39		0.90	0.25
Control Delay		19.7	20.1		40.4	2.3
Queue Delay		0.0	5.8		13.7	0.0
Total Delay		19.7	25.9		54.1	2.3
LOS		B	C		D	A
Approach Delay		19.7	25.9		42.7	
Approach LOS		B	C		D	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		127	129		411	0
Queue Length 95th (ft)		212	203		457	30
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1666	877		1067	1036
Starvation Cap Reductn		0	469		0	0
Spillback Cap Reductn		94	0		335	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.39	0.84		0.98	0.20

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 68 (68%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 32.1 Intersection LOS: C
Intersection Capacity Utilization 59.9% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



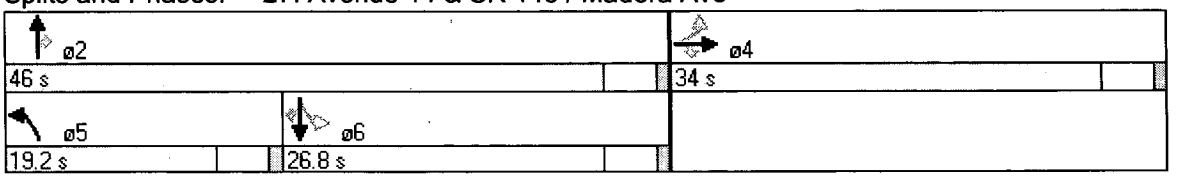
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.966					0.950				0.998	
Satd. Flow (prot)	0	1748	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted		0.966					0.950				0.925	
Satd. Flow (perm)	0	1748	1538	0	0	0	1752	1845	1568	0	3242	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			599						21			285
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	267	114	551	0	0	0	155	615	19	11	269	262
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	290	124	599	0	0	0	168	668	21	12	292	285
Lane Group Flow (vph)	0	414	599	0	0	0	168	668	21	0	304	285
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	34.0	34.0	34.0	0.0	0.0	0.0	19.2	46.0	46.0	26.8	26.8	26.8
Total Split (%)	42.5%	42.5%	42.5%	0.0%	0.0%	0.0%	24.0%	57.5%	57.5%	33.5%	33.5%	33.5%
Maximum Green (s)	29.4	29.4	29.4				14.6	41.4	41.4	22.2	22.2	22.2
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		28.6	28.6				12.8	43.4	43.4		26.7	26.7
Actuated g/C Ratio		0.36	0.36				0.16	0.54	0.54		0.33	0.33
v/c Ratio		0.66	0.64				0.60	0.67	0.02		0.28	0.40
Control Delay		25.4	7.5				40.1	17.7	4.2		11.8	3.6
Queue Delay		81.5	1.7				0.1	0.0	0.0		0.0	0.0
Total Delay		106.9	9.2				40.3	17.7	4.2		11.8	3.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				D	B	A		B	A
Approach Delay		49.2						21.8			7.9	
Approach LOS		D						C			A	
Queue Length 50th (ft)		124	0				78	234	0		27	0
Queue Length 95th (ft)		m244	m108				136	357	10		m77	m57
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		661	954				334	1007	865		1092	717
Starvation Cap Reductn		305	200				0	0	0		0	0
Spillback Cap Reductn		0	0				7	0	0		0	24
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.16	0.79				0.51	0.66	0.02		0.28	0.41

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 29.7 Intersection LOS: C
Intersection Capacity Utilization 70.9% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	0		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.969					0.950				0.997	
Satd. Flow (prot)	0	1770	1553	0	0	0	1770	1863	1583	0	3529	1583
Flt Permitted		0.969					0.950				0.726	
Satd. Flow (perm)	0	1770	1553	0	0	0	1770	1863	1583	0	2569	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			579						16			208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	319	187	719	0	0	0	123	978	16	19	296	191
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	347	203	782	0	0	0	134	1063	17	21	322	208
Lane Group Flow (vph)	0	550	782	0	0	0	134	1063	17	0	343	208
Turn Type	Perm		Perm				Prot		Perm	Perm		Perm
Protected Phases		4					5	2			6	
Permitted Phases	4		4						2	6		6
Detector Phases	4	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	36.1	36.1	36.1	0.0	0.0	0.0	19.1	63.9	63.9	44.8	44.8	44.8
Total Split (%)	36.1%	36.1%	36.1%	0.0%	0.0%	0.0%	19.1%	63.9%	63.9%	44.8%	44.8%	44.8%
Maximum Green (s)	31.5	31.5	31.5				14.5	59.3	59.3	40.2	40.2	40.2
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	5.0	5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	0
Act Effct Green (s)		32.2	32.2				12.6	59.8	59.8		43.1	43.1
Actuated g/C Ratio		0.32	0.32				0.13	0.60	0.60		0.43	0.43
v/c Ratio		0.96	0.88				0.60	0.96	0.02		0.31	0.26
Control Delay		54.6	19.3				52.3	38.3	3.9		4.0	0.6
Queue Delay		213.3	5.5				0.0	0.0	0.0		0.0	0.6
Total Delay		267.9	24.8				52.3	38.3	3.9		4.0	1.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	C				D	D	A		A	A
Approach Delay		125.2						39.4			3.0	
Approach LOS		F						D			A	
Queue Length 50th (ft)		367	141				81	587	0		22	3
Queue Length 95th (ft)		m#475	m#232				140	#919	9		m28	m4
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)		571	893				267	1116	955		1108	801
Starvation Cap Reductn		203	74				0	0	0		0	0
Spillback Cap Reductn		0	0				0	0	0		0	316
Storage Cap Reductn		0	0				0	0	0		0	0
Reduced v/c Ratio		1.49	0.95				0.50	0.95	0.02		0.31	0.43

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 4 (4%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 69.8 Intersection LOS: E
Intersection Capacity Utilization 97.7% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	167			150	239
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	37	189	0	0	170	271
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				201		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	228	0	25
Percent Heavy Vehicles	0	0	0	25	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	37						253	
C (m) (veh/h)	956						446	
v/c	0.04						0.57	
95% queue length	0.12						3.44	
Control Delay (s/veh)	8.9						23.1	
LOS	A						C	
Approach Delay (s/veh)	–	–				23.1		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Pistachio Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	13	228			209	261
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	14	259	0	0	237	296
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				212		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	240	0	25
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	14						265	
C (m) (veh/h)	891						421	
v/c	0.02						0.63	
95% queue length	0.05						4.19	
Control Delay (s/veh)	9.1						27.0	
LOS	A						D	
Approach Delay (s/veh)	–	–				27.0		
Approach LOS	–	–				D		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	61			70	96
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	2	69	0	0	79	109
Percent Heavy Vehicles	8	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				98		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	111	0	2
Percent Heavy Vehicles	0	0	0	79	0	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	2						113	
C (m) (veh/h)	1351						690	
v/c	0.00						0.16	
95% queue length	0.00						0.58	
Control Delay (s/veh)	7.7						11.2	
LOS	A						B	
Approach Delay (s/veh)	–	–				11.2		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/8/2006 9:07 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Golden State
Agency/Co.	TPG Consulting	Jurisdiction	County of Madera
Date Performed	9/7/2006	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Golden State Blvd
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	122			139	99
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	138	0	0	157	112
Percent Heavy Vehicles	5	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				107		2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	121	0	2
Percent Heavy Vehicles	0	0	0	48	0	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	5						123	
C (m) (veh/h)	1277						601	
v/c	0.00						0.20	
95% queue length	0.01						0.76	
Control Delay (s/veh)	7.8						12.5	
LOS	A						B	
Approach Delay (s/veh)	–	–				12.5		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/8/2006 9:08 AM

ATTACHMENT VI – C - 16

OPENING DAY (2008) PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 07/25/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR 99-NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

in built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

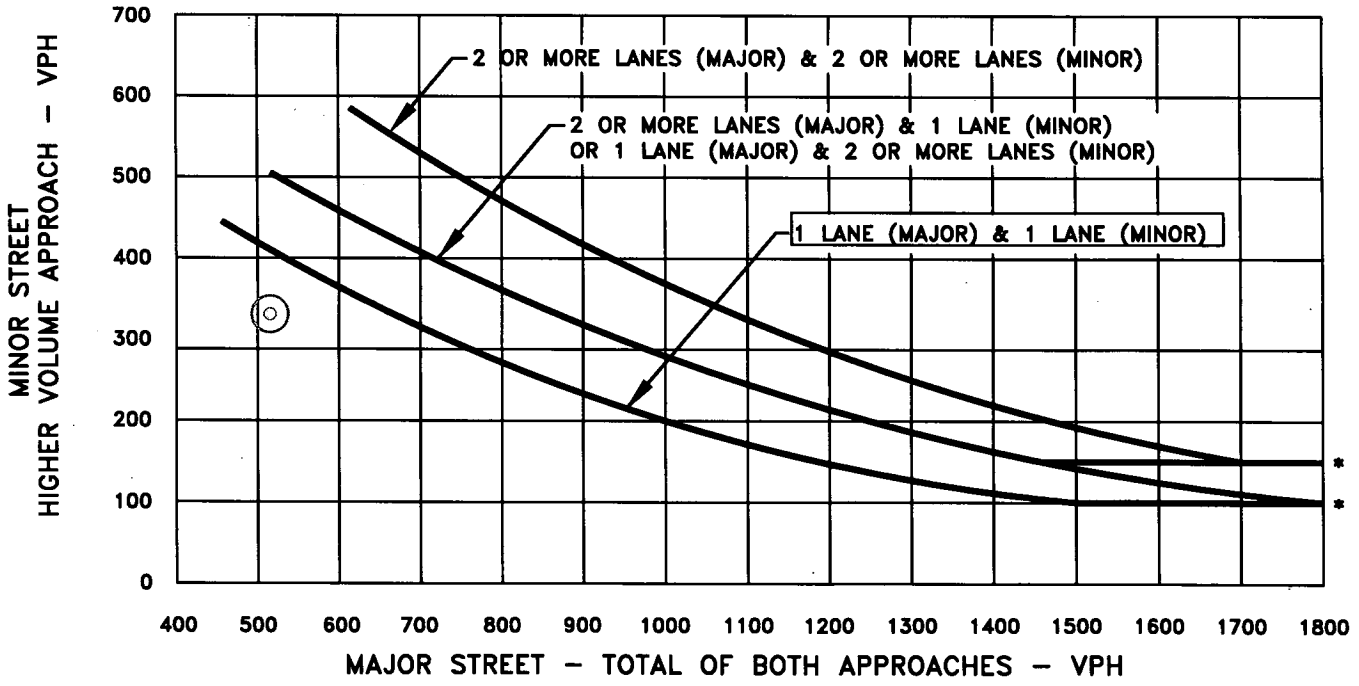
CONDITION: 2008 PROJECT ALT C

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		382	515			
Highest Approaches – Minor Street	✓		264	331			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 07/25/06 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☐ URBAN (U)

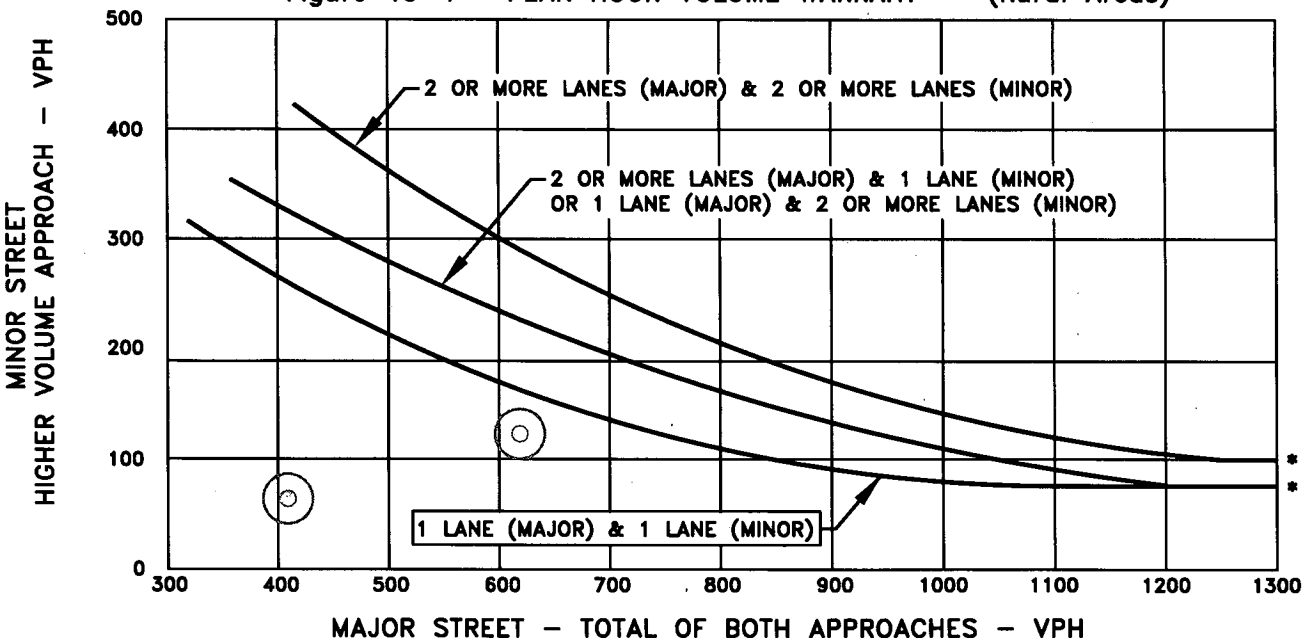
CONDITION: 2008 PROJECT ALT C

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		409	619				
Highest Approaches – Minor Street	✓		64	123				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 07/25/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 15 1/2 Critical Approach Speed NPS mph

MINOR STREET: ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

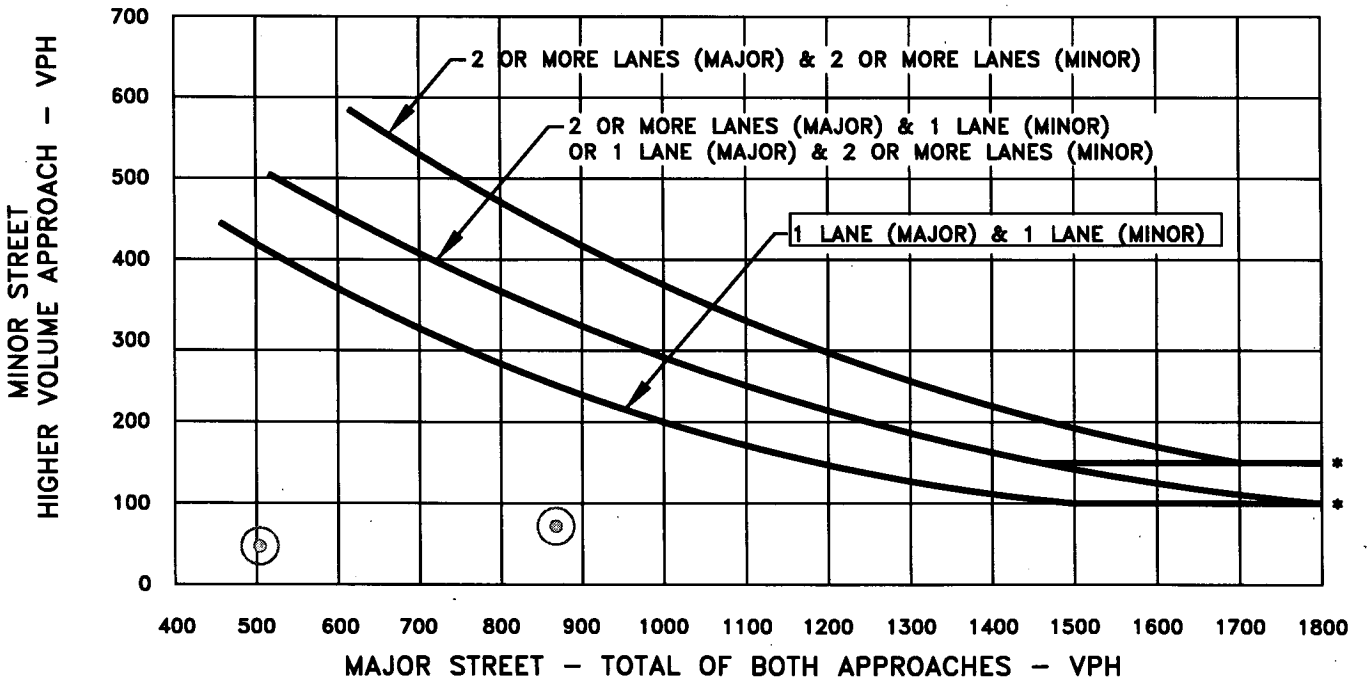
CONDITION: 2008 PROJECT ALT C

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		504	867			
Highest Approaches – Minor Street	✓		47	72			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR-99 NB ON RAMP Critical Approach Speed NPS mph

MINOR STREET: GATEWAY/AVENUE 16 Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

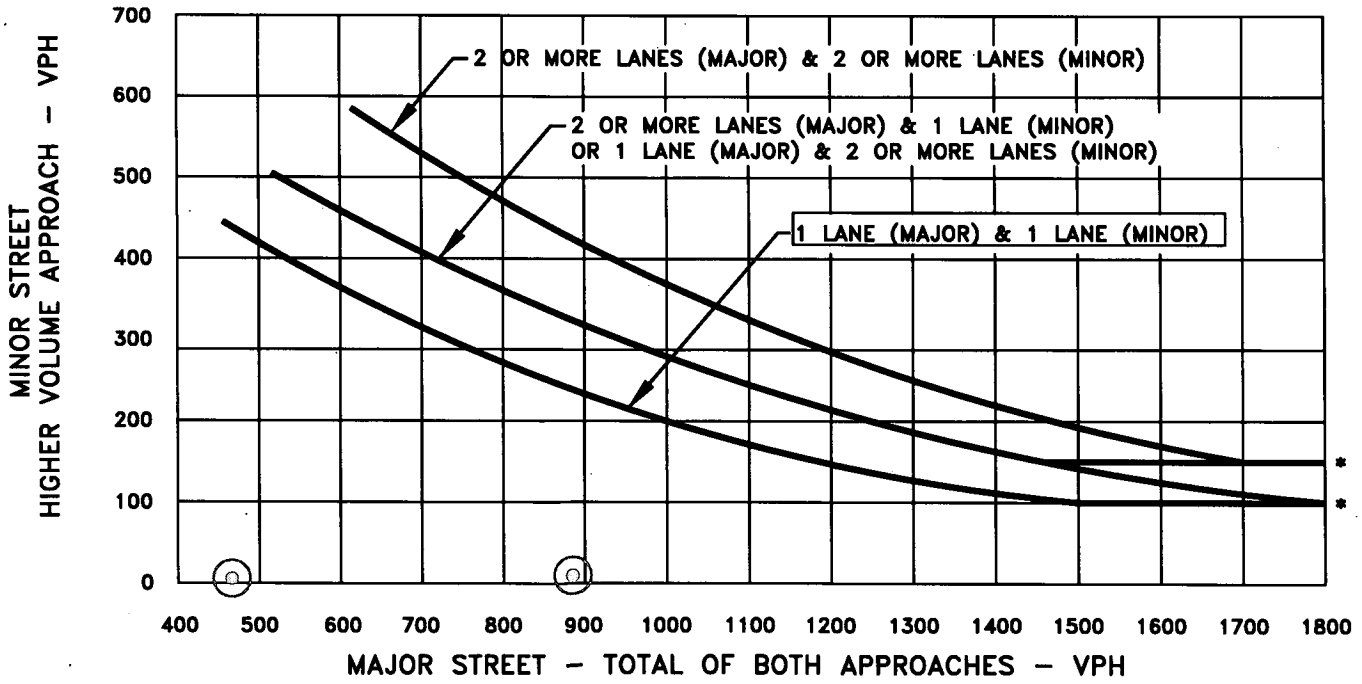
CONDITION: 2008 PROJECT ALT C

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		466	885			
Highest Approaches – Minor Street	✓		6	10			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: PISTACHIO DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

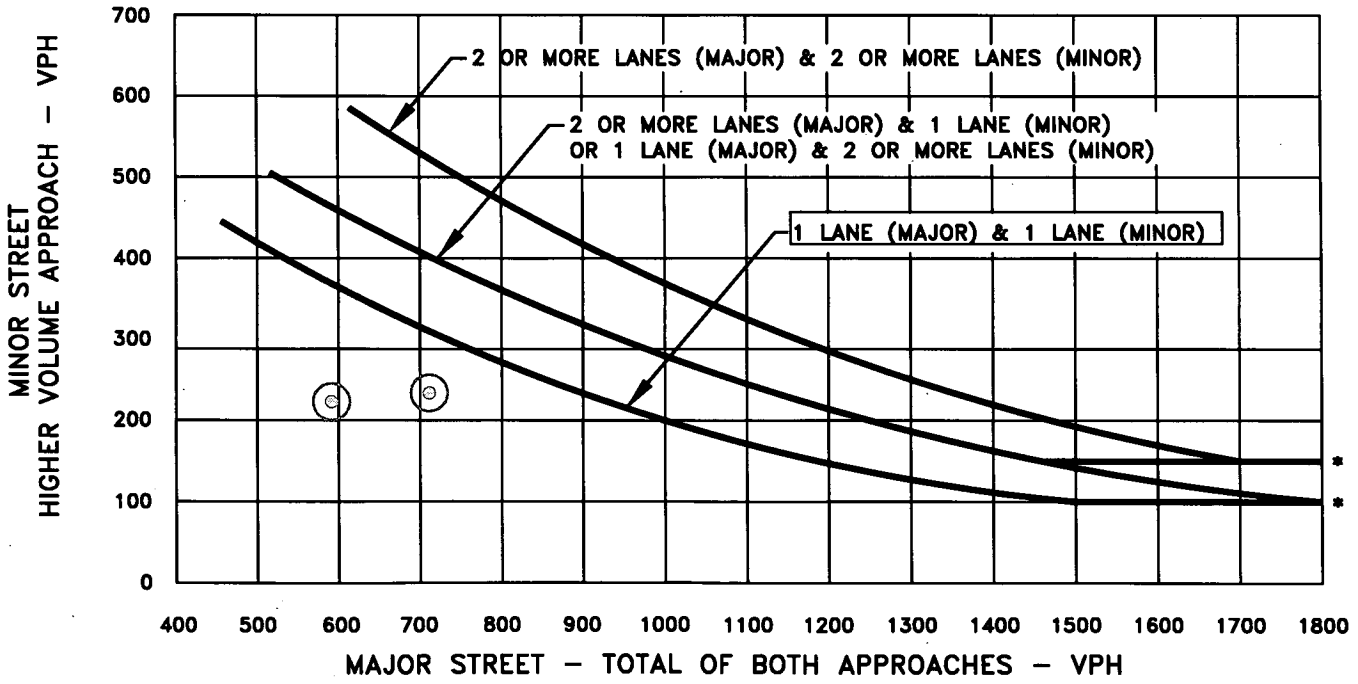
CONDITION: 2008 PROJECT ALTERNATIVE C

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		589	711			
Highest Approaches – Minor Street	✓		223	234			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: GOLDEN STATE BLVD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

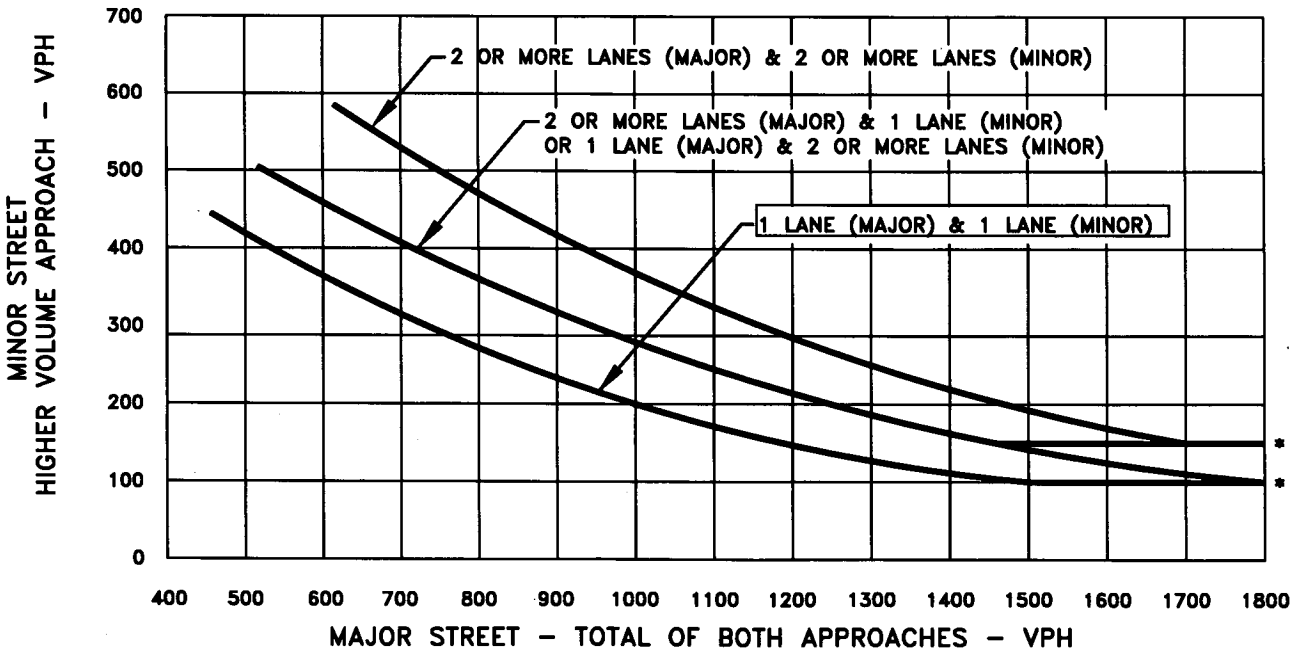
CONDITION: 2008 PROJECT ALTERNATIVE C

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		229	365			
Highest Approaches – Minor Street	✓		100	109			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

ATTACHMENT VI – C - 17

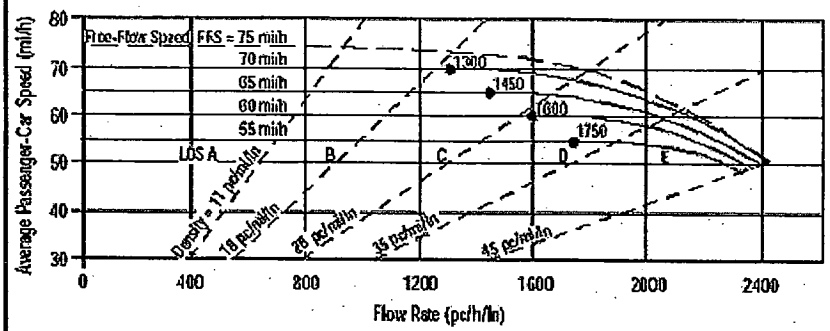
MITIGATED OPENING DAY (2008)

PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2749*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

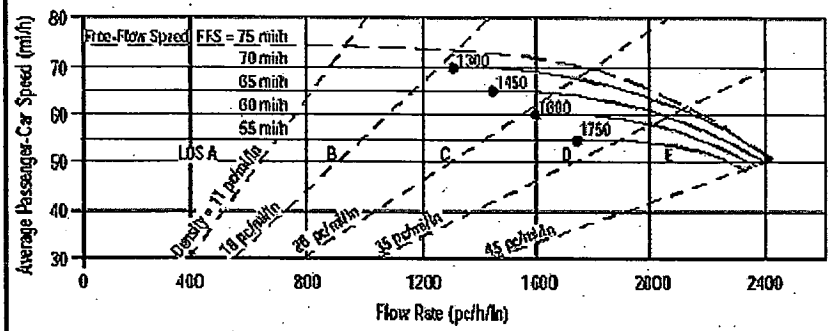
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1120*	pc/h/ln	Design LOS	
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*16.0*	pc/mi/ln	S	mi/h
LOS	*B*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2924*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

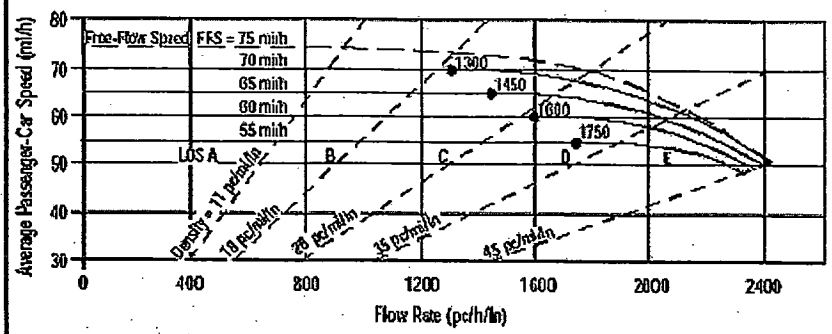
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1191*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*17.0*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*B/C 14.3/21.72008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2324*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

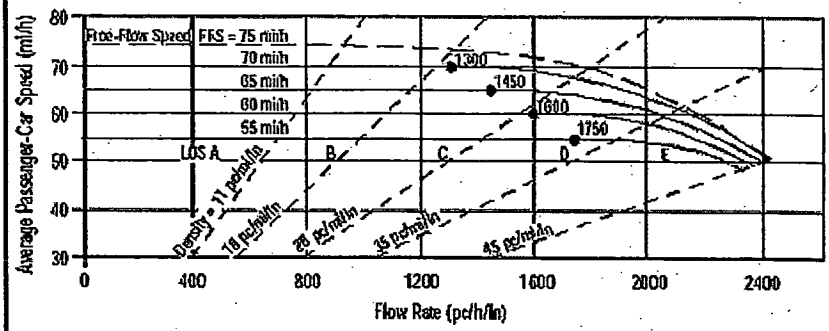
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*946*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*13.5*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*B/C 14.3/21.72008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3502*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

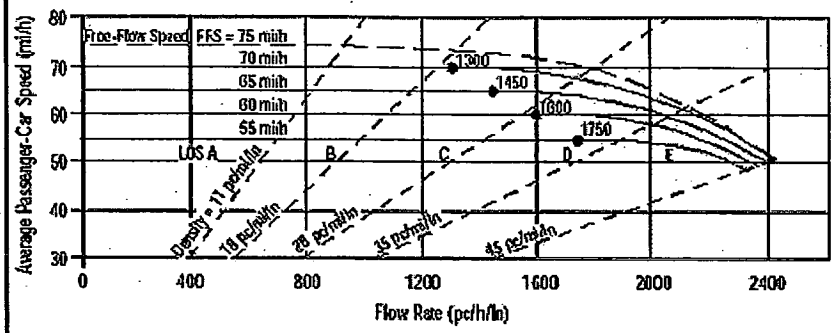
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1426*	pc/h/ln	Design LOS	
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*20.4*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2975*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

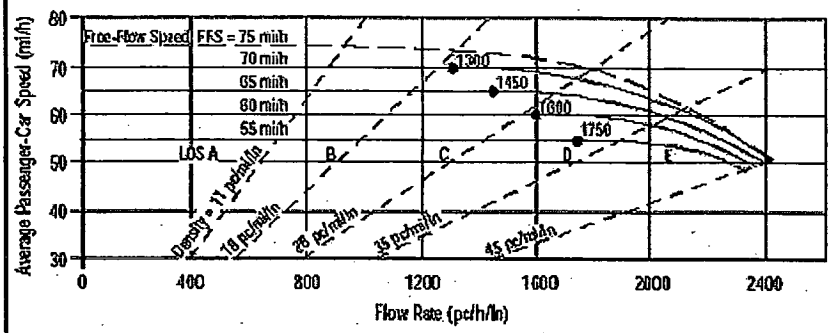
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1212*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*17.3*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2008 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3083*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1256*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*17.9*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

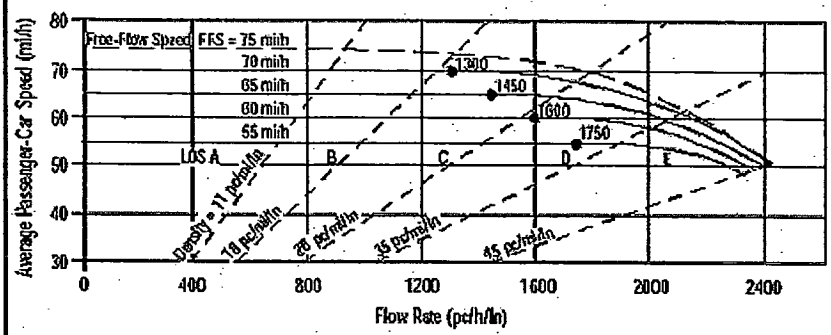
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1003*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*14.3*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

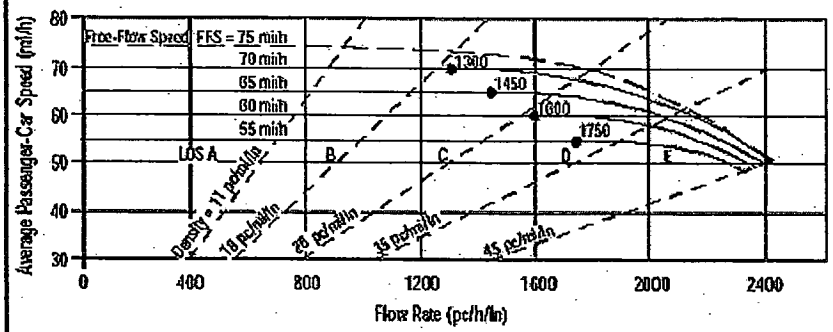
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3715*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

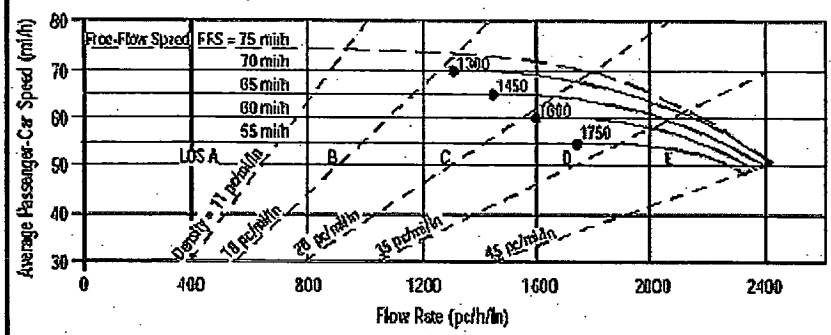
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1513*	pc/h/ln	Design LOS		
S	*69.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*21.7*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2008 Alt A AM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3543*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1443*	pc/h/ln
S	*69.9*	mi/h
D = v_p / S	*20.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

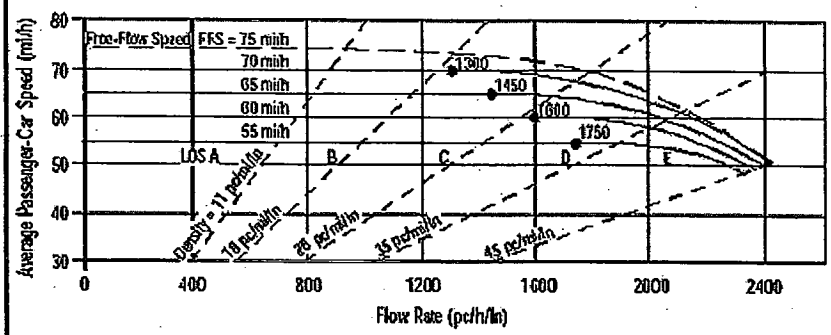
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2008 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4271*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1739*	pc/h/ln
S	*68.5*	mi/h
D = v_p / S	*25.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

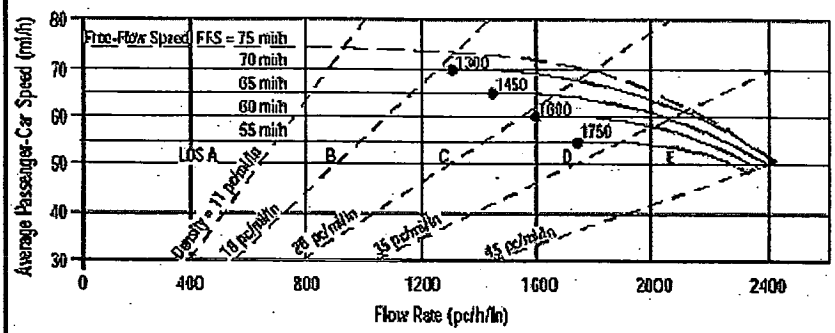
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2725*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*832*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*11.9*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

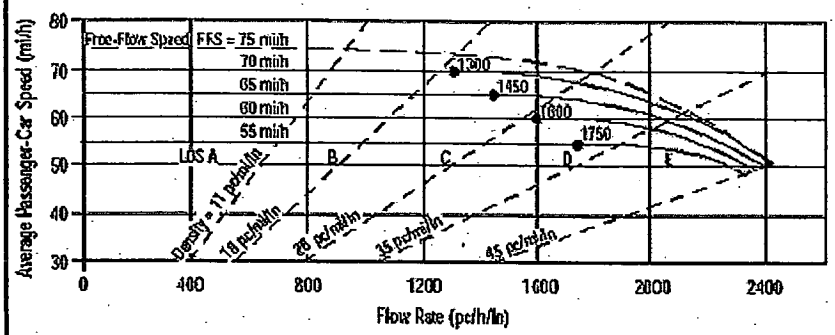
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*4840*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T-1)+P_R(E_R-1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1478*	pc/h/ln
S	*69.9*	mi/h
D = v_p / S	*21.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 18

MITIGATED OPENING DAY (2008)

PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		25	0		0
Storage Lanes	0		0	1		0	1		1	0		0
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
Leading Detector (ft)		50		50	50		50		50	50	50	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977							0.850		0.959	
Flt Protected				0.950			0.950				0.997	
Satd. Flow (prot)	0	1205	0	1188	1250	0	1770	0	1583	0	1121	0
Flt Permitted				0.950			0.508				0.997	
Satd. Flow (perm)	0	1205	0	1188	1250	0	946	0	1583	0	1121	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22							152		36	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		285			942			3168			3472	
Travel Time (s)		5.6			18.4			72.0			78.9	
Volume (vph)	0	355	71	37	256	0	64	0	134	12	139	66
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	54%	54%	54%	52%	52%	52%	2%	2%	2%	62%	62%	62%
Adj. Flow (vph)	0	403	81	42	291	0	73	0	152	14	158	75
Lane Group Flow (vph)	0	484	0	42	291	0	73	0	152	0	247	0
Turn Type				Prot			custom		custom	Perm		
Protected Phases		4		3	8						6	
Permitted Phases							2		2	6		
Detector Phases		4		3	8		2		2	6	6	
Minimum Initial (s)		4.0		4.0	4.0		4.0		4.0	4.0	4.0	
Minimum Split (s)		20.9		8.6	20.9		20.9		20.9	20.9	20.9	
Total Split (s)	0.0	30.5	0.0	8.6	39.1	0.0	20.9	0.0	20.9	20.9	20.9	0.0
Total Split (%)	0.0%	50.8%	0.0%	14.3%	65.2%	0.0%	34.8%	0.0%	34.8%	34.8%	34.8%	0.0%
Maximum Green (s)		25.9		4.0	34.5		16.3		16.3	16.3	16.3	
Yellow Time (s)		3.6		3.6	3.6		3.6		3.6	3.6	3.6	
All-Red Time (s)		1.0		1.0	1.0		1.0		1.0	1.0	1.0	
Lead/Lag		Lead		Lag								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode		C-Max		None	C-Max		Max		Max	Max	Max	
Act Effct Green (s)		29.9		4.6	35.1		16.9		16.9		16.9	
Actuated g/C Ratio		0.50		0.08	0.58		0.28		0.28		0.28	
v/c Ratio		0.79		0.46	0.40		0.27		0.27		0.72	
Control Delay		26.6		31.1	2.4		20.2		5.0		31.5	
Queue Delay		1.0		0.0	0.0		0.0		0.0		0.0	
Total Delay		27.7		31.1	2.4		20.2		5.0		31.5	
LOS		C		C	A		C		A		C	
Approach Delay		27.7			6.0						31.5	
Approach LOS		C			A						C	

J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)		25.9		4.0	34.5		16.3		16.3	16.3	16.3	
90th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
70th %ile Green (s)		25.9		4.0	34.5		16.3		16.3	16.3	16.3	
70th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
50th %ile Green (s)		25.9		4.0	34.5		16.3		16.3	16.3	16.3	
50th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
30th %ile Green (s)		34.5		0.0	34.5		16.3		16.3	16.3	16.3	
30th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
10th %ile Green (s)		34.5		0.0	34.5		16.3		16.3	16.3	16.3	
10th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
Queue Length 50th (ft)		146		14	7		20		0		68	
Queue Length 95th (ft)		#310		m23	m10		50		33		#164	
Internal Link Dist (ft)		205			862			3088			3392	
Turn Bay Length (ft)									25			
Base Capacity (vph)		612		91	731		266		555		342	
Starvation Cap Reductn		28		0	0		0		0		0	
Spillback Cap Reductn		0		0	0		0		0		0	
Storage Cap Reductn		0		0	0		0		0		0	
Reduced v/c Ratio		0.83		0.46	0.40		0.27		0.27		0.72	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 50 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 55.2% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp

ø2	ø4	ø3
20.9 s	30.5 s	8.6 s

ø6	ø8
20.9 s	39.1 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		25	0		0
Storage Lanes	0		0	1		0	1		1	0		0
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
Leading Detector (ft)		50		50	50		50		50	50	50	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977							0.850		0.952	
Flt Protected				0.950			0.950				0.995	
Satd. Flow (prot)	0	1439	0	1480	1557	0	1504	0	1346	0	1314	0
Flt Permitted				0.950			0.383				0.995	
Satd. Flow (perm)	0	1439	0	1480	1557	0	606	0	1346	0	1314	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18							257		43	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		285			942			3168			3472	
Travel Time (s)		5.6			18.4			72.0			78.9	
Volume (vph)	0	372	76	52	288	0	65	0	226	36	194	127
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	29%	22%	22%	22%	20%	20%	20%	37%	37%	37%
Adj. Flow (vph)	0	423	86	59	327	0	74	0	257	41	220	144
Lane Group Flow (vph)	0	509	0	59	327	0	74	0	257	0	405	0
Turn Type				Prot			custom		custom	Perm		
Protected Phases		4		3	8						6	
Permitted Phases							2		2	6		
Detector Phases		4		3	8		2		2	6	6	
Minimum Initial (s)		4.0		4.0	4.0		4.0		4.0	4.0	4.0	
Minimum Split (s)		20.9		8.6	20.9		20.9		20.9	20.9	20.9	
Total Split (s)	0.0	33.0	0.0	9.0	42.0	0.0	28.0	0.0	28.0	28.0	28.0	0.0
Total Split (%)	0.0%	47.1%	0.0%	12.9%	60.0%	0.0%	40.0%	0.0%	40.0%	40.0%	40.0%	0.0%
Maximum Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
Yellow Time (s)		3.6		3.6	3.6		3.6		3.6	3.6	3.6	
All-Red Time (s)		1.0		1.0	1.0		1.0		1.0	1.0	1.0	
Lead/Lag		Lead		Lag								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode		C-Max		None	C-Max		Max		Max	Max	Max	
Act Effct Green (s)		32.6		5.0	38.0		24.0		24.0		24.0	
Actuated g/C Ratio		0.47		0.07	0.54		0.34		0.34		0.34	
v/c Ratio		0.75		0.56	0.39		0.36		0.41		0.85	
Control Delay		25.5		39.1	1.6		23.3		4.7		37.9	
Queue Delay		4.7		0.0	0.0		0.0		0.0		0.0	
Total Delay		30.2		39.1	1.6		23.3		4.7		37.9	
LOS		C		D	A		C		A		D	
Approach Delay		30.2			7.3						37.9	
Approach LOS		C			A						D	

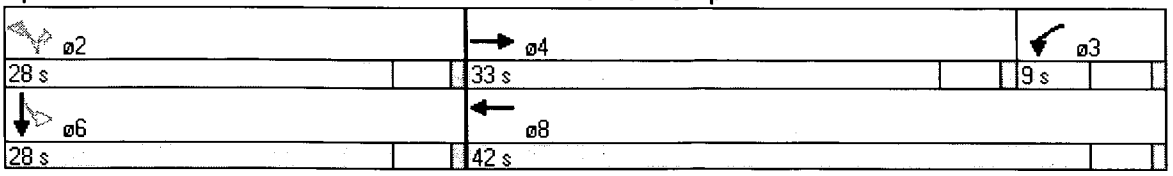
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
90th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
70th %ile Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
70th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
50th %ile Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
50th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
30th %ile Green (s)		37.4		0.0	37.4		23.4		23.4	23.4	23.4	
30th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
10th %ile Green (s)		37.4		0.0	37.4		23.4		23.4	23.4	23.4	
10th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
Queue Length 50th (ft)		184		28	3		23		0		143	
Queue Length 95th (ft)		#344		m40	m4		57		42		#287	
Internal Link Dist (ft)		205			862			3088			3392	
Turn Bay Length (ft)									25			
Base Capacity (vph)		680		106	845		208		630		479	
Starvation Cap Reductn		111		0	0		0		0		0	
Spillback Cap Reductn		0		0	0		0		0		0	
Storage Cap Reductn		0		0	0		0		0		0	
Reduced v/c Ratio		0.89		0.56	0.39		0.36		0.41		0.85	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 65 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 22.4 Intersection LOS: C
Intersection Capacity Utilization 68.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.974				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1220	1284	0	0	1698	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1220	1284	0	0	1698	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					20				15			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	200	58	0	0	99	24	242	0	22	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	227	66	0	0	112	27	275	0	25	0	0	0
Lane Group Flow (vph)	227	66	0	0	139	0	0	275	25	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	18.0	39.1	0.0	0.0	21.1	0.0	20.9	20.9	20.9	0.0	0.0	0.0
Total Split (%)	30.0%	65.2%	0.0%	0.0%	35.2%	0.0%	34.8%	34.8%	34.8%	0.0%	0.0%	0.0%
Maximum Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	14.0	36.5			18.5			15.5	15.5			
Actuated g/C Ratio	0.23	0.61			0.31			0.26	0.26			
v/c Ratio	0.80	0.08			0.26			0.80	0.08			
Control Delay	33.2	2.3			15.7			39.7	11.2			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	33.2	2.3			15.7			39.7	11.2			

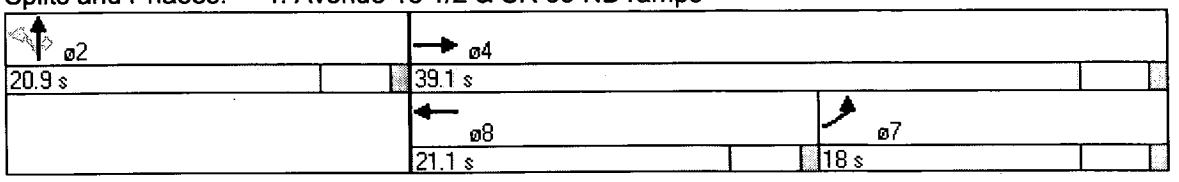
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B			D	B			
Approach Delay		26.2			15.7			37.3				
Approach LOS		C			B			D				
90th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	13.4	36.0			18.0		14.8	14.8	14.8			
30th %ile Term Code	Max	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	13.4	40.2			22.2		10.6	10.6	10.6			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	63	3			33			89	3			
Queue Length 95th (ft)	m#126	m7			70			#187	17			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	285	782			538			377	348			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.80	0.08			0.26			0.73	0.07			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 28.8 Intersection LOS: C
Intersection Capacity Utilization 41.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1480	1557	0	0	1637	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1480	1557	0	0	1637	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5				23			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	275	97	0	0	131	10	285	0	46	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	312	110	0	0	149	11	324	0	52	0	0	0
Lane Group Flow (vph)	312	110	0	0	160	0	0	324	52	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	24.0	46.0	0.0	0.0	22.0	0.0	24.0	24.0	24.0	0.0	0.0	0.0
Total Split (%)	34.3%	65.7%	0.0%	0.0%	31.4%	0.0%	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	20.0	43.7			19.7			18.3	18.3			
Actuated g/C Ratio	0.29	0.62			0.28			0.26	0.26			
v/c Ratio	0.74	0.11			0.34			0.83	0.14			
Control Delay	24.9	3.3			22.8			43.1	13.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	24.9	3.3			22.8			43.1	13.3			

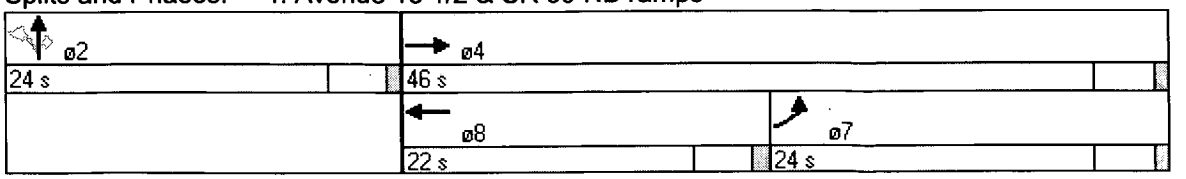
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		19.3			22.8			39.0				
Approach LOS		B			C			D				
90th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	19.4	43.6			19.6		17.2	17.2	17.2			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	19.4	47.9			23.9		12.9	12.9	12.9			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	95	8			55			126	9			
Queue Length 95th (ft)	m#162	m18			102			#236	32			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	423	973			465			430	401			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.74	0.11			0.34			0.75	0.13			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.6 Intersection LOS: C
Intersection Capacity Utilization 48.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3374	3505	0	1703	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	3374	3505	0	1703	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						59
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	723	1059	0	135	62
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	822	1203	0	153	70
Lane Group Flow (vph)	0	822	1203	0	153	70
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	42.7	42.7	0.0	27.3	27.3
Total Split (%)	0.0%	61.0%	61.0%	0.0%	39.0%	39.0%
Maximum Green (s)		37.4	37.4		22.0	22.0
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		49.6	49.6		12.4	12.4
Actuated g/C Ratio		0.71	0.71		0.18	0.18
v/c Ratio		0.34	0.48		0.51	0.22
Control Delay		1.6	2.7		31.4	10.3
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		1.6	2.7		31.4	10.3
LOS		A	A		C	B
Approach Delay		1.6	2.7		24.8	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)		16	7		60	4
Queue Length 95th (ft)		31	67		102	31
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2393	2486		567	547
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.34	0.48		0.27	0.13

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 59 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 4.5 Intersection LOS: A
Intersection Capacity Utilization 56.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3343	0	1671	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3343	0	1671	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						26
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1737	1608	0	282	74
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	1974	1827	0	320	84
Lane Group Flow (vph)	0	1974	1827	0	320	84
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	70.0	70.0	0.0	30.0	30.0
Total Split (%)	0.0%	70.0%	70.0%	0.0%	30.0%	30.0%
Maximum Green (s)		64.7	64.7		24.7	24.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		68.6	68.6		23.4	23.4
Actuated g/C Ratio		0.69	0.69		0.23	0.23
v/c Ratio		0.83	0.80		0.82	0.23
Control Delay		3.4	7.9		53.6	22.7
Queue Delay		0.5	0.0		0.0	0.0
Total Delay		3.9	7.9		53.6	22.7
LOS		A	A		D	C
Approach Delay		3.9	7.9		47.1	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		D	
Queue Length 50th (ft)		73	278		188	29
Queue Length 95th (ft)		m81	m328		#282	66
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2381	2293		434	408
Starvation Cap Reductn		110	0		0	0
Spillback Cap Reductn		0	2		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.87	0.80		0.74	0.21

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 99 (99%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 76.4% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp

Mitigated 2008 Project Alt A AM
6: Avenue 17 & SR 99 NB ramps 7/21/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.957				
Satd. Flow (prot)	1752	3505	0	0	3539	1583	1681	1694	2787	0	0	0
Flt Permitted	0.950						0.950	0.957				
Satd. Flow (perm)	1752	3505	0	0	3539	1583	1681	1694	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73			308			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	42	298	0	0	814	64	695	36	271	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	48	339	0	0	925	73	790	41	308	0	0	0
Lane Group Flow (vph)	48	339	0	0	925	73	405	426	308	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	10.0	40.0	0.0	0.0	30.0	30.0	30.0	30.0	30.0	0.0	0.0	0.0
Total Split (%)	14.3%	57.1%	0.0%	0.0%	42.9%	42.9%	42.9%	42.9%	42.9%	0.0%	0.0%	0.0%
Maximum Green (s)	4.7	34.7			24.7	24.7	24.7	24.7	24.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	6.0	39.0			33.0	33.0	23.0	23.0	23.0			
Actuated g/C Ratio	0.09	0.56			0.47	0.47	0.33	0.33	0.33			
v/c Ratio	0.32	0.17			0.55	0.09	0.73	0.76	0.27			
Control Delay	27.5	5.9			17.0	4.6	28.9	30.5	2.8			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	27.5	5.9			17.0	4.6	28.9	30.5	2.8			
LOS	C	A			B	A	C	C	A			
Approach Delay		8.5			16.1			22.4				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			B			C				
Queue Length 50th (ft)	15	21			173	0	149	158	0			
Queue Length 95th (ft)	m41	38			230	22	236	250	22			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	150	1953			1668	785	624	629	1229			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.32	0.17			0.55	0.09	0.65	0.68	0.25			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 56 (80%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 17.8 Intersection LOS: B
Intersection Capacity Utilization 56.0% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps

Mitigated 2008 Project Alt A PM
6: Avenue 17 & SR 99 NB ramps 7/21/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.950				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1681	2787	0	0	0
Flt Permitted	0.950						0.950	0.950				
Satd. Flow (perm)	1770	3539	0	0	3539	1583	1681	1681	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						197			170			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	57	860	0	0	1325	194	955	0	1011	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	65	977	0	0	1506	220	1085	0	1149	0	0	0
Lane Group Flow (vph)	65	977	0	0	1506	220	543	542	1149	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	9.3	57.4	0.0	0.0	48.1	48.1	42.6	42.6	42.6	0.0	0.0	0.0
Total Split (%)	9.3%	57.4%	0.0%	0.0%	48.1%	48.1%	42.6%	42.6%	42.6%	0.0%	0.0%	0.0%
Maximum Green (s)	4.0	52.1			42.8	42.8	37.3	37.3	37.3			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	5.3	53.4			46.0	46.0	38.6	38.6	38.6			
Actuated g/C Ratio	0.05	0.53			0.46	0.46	0.39	0.39	0.39			
v/c Ratio	0.69	0.52			0.93	0.26	0.84	0.84	0.97			
Control Delay	64.2	13.4			37.4	4.3	41.2	41.1	47.2			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	64.2	13.4			37.4	4.3	41.2	41.1	47.2			
LOS	E	B			D	A	D	D	D			
Approach Delay		16.6			33.1			44.3				
Approach LOS		B			C			D				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	40	131			478	8	325	324	356			
Queue Length 95th (ft)	m49	161			#618	47	#498	#497	#503			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	94	1890			1627	834	649	649	1180			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.69	0.52			0.93	0.26	0.84	0.84	0.97			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 8 (8%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 34.7 Intersection LOS: C
Intersection Capacity Utilization 76.4% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps

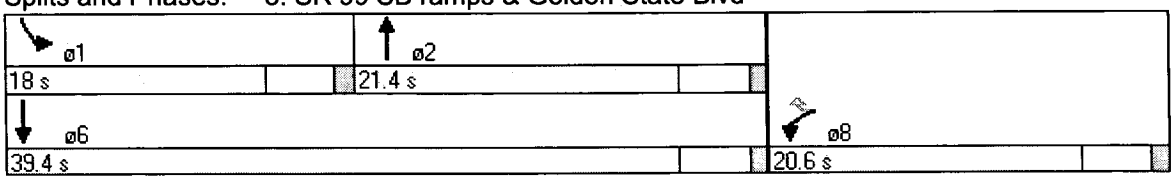
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.921			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1626	1455	1716	0	1770	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1626	1455	1716	0	1770	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		243	119			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	63	214	89	125	209	25
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	72	243	101	142	238	28
Lane Group Flow (vph)	72	243	243	0	238	28
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	20.6	20.6	21.4	0.0	18.0	39.4
Total Split (%)	34.3%	34.3%	35.7%	0.0%	30.0%	65.7%
Maximum Green (s)	16.0	16.0	16.8		13.4	34.8
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	8.8	8.8	25.3		13.9	43.2
Actuated g/C Ratio	0.15	0.15	0.42		0.23	0.72
v/c Ratio	0.30	0.58	0.31		0.58	0.02
Control Delay	25.1	9.5	1.9		25.6	3.2
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	25.1	9.5	1.9		25.6	3.2
LOS	C	A	A		C	A
Approach Delay	13.1		1.9			23.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		A			C
Queue Length 50th (ft)	24	0	2		77	2
Queue Length 95th (ft)	50	46	m16		118	9
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	450	578	802		457	1340
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.16	0.42	0.30		0.52	0.02

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 1 (2%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 37.4% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



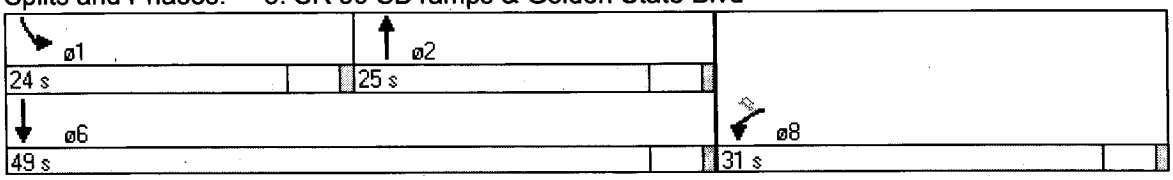
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.930			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1538	1732	0	1641	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1538	1732	0	1641	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		710	65			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	170	625	143	152	246	35
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	193	710	162	173	280	40
Lane Group Flow (vph)	193	710	335	0	280	40
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	31.0	31.0	25.0	0.0	24.0	49.0
Total Split (%)	38.8%	38.8%	31.3%	0.0%	30.0%	61.3%
Maximum Green (s)	26.4	26.4	20.4		19.4	44.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.8	16.8	33.2		18.1	55.2
Actuated g/C Ratio	0.21	0.21	0.42		0.23	0.69
v/c Ratio	0.54	0.80	0.44		0.76	0.03
Control Delay	32.2	9.9	2.1		42.3	5.9
Queue Delay	0.0	0.0	0.3		0.0	0.0
Total Delay	32.2	9.9	2.4		42.3	5.9
LOS	C	A	A		D	A
Approach Delay	14.7		2.4			37.8

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		A			D
Queue Length 50th (ft)	88	0	1		129	5
Queue Length 95th (ft)	120	64	m30		204	21
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	580	989	757		421	1192
Starvation Cap Reductn	0	0	94		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.33	0.72	0.51		0.67	0.03

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 5 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 16.8 Intersection LOS: B
Intersection Capacity Utilization 62.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Mitigated 2008 Project Alt A AM
7: Avenue 12 & Golden State Blvd 7/21/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.986			0.852				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		8			313				24
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	180	249	24	83	292	29	70	5	288	61	5	22
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	196	271	26	90	317	32	76	5	313	66	5	24
Lane Group Flow (vph)	196	271	26	90	349	0	76	318	0	66	5	24
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	10.0	20.9	20.9	9.9	20.8	0.0	8.6	20.6	0.0	8.6	20.6	20.6
Total Split (%)	16.7%	34.8%	34.8%	16.5%	34.7%	0.0%	14.3%	34.3%	0.0%	14.3%	34.3%	34.3%
Maximum Green (s)	5.4	16.3	16.3	5.3	16.2		4.0	16.0		4.0	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	14.2	28.5	28.5	5.9	18.2		4.6	10.4		4.6	8.7	8.7
Actuated g/C Ratio	0.24	0.48	0.48	0.10	0.30		0.08	0.17		0.08	0.14	0.14
v/c Ratio	0.50	0.33	0.04	0.54	0.65		0.61	0.62		0.50	0.02	0.10
Control Delay	30.6	14.4	6.5	30.1	17.4		51.1	9.1		29.2	11.6	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	30.6	14.4	6.5	30.1	17.4		51.1	9.1		29.2	11.6	6.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B	A	C	B		D	A		C	B	A
Approach Delay		20.4			20.0			17.2			22.6	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	59	61	0	34	68		27	2		26	2	0
Queue Length 95th (ft)	#181	142	14	m#59	#117		#83	55		#32	m5	19
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	389	820	711	167	541		124	626		132	501	443
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.33	0.04	0.54	0.65		0.61	0.51		0.50	0.01	0.05

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 8 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 19.6 Intersection LOS: B
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

ø1	ø2	ø4	ø3
8.6 s	20.6 s	20.9 s	9.9 s

ø5	ø6	ø7	ø8
8.6 s	20.6 s	10 s	20.8 s

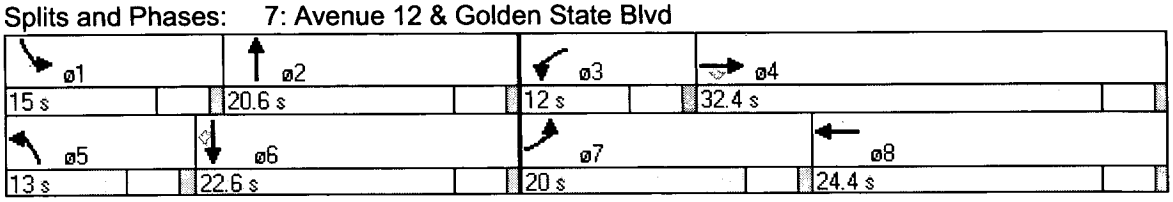
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996			0.855				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1785	0	1687	1518	0	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1785	0	1687	1518	0	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		2			313				36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	276	418	14	101	344	10	149	9	288	174	9	33
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	300	454	15	110	374	11	162	10	313	189	10	36
Lane Group Flow (vph)	300	454	15	110	385	0	162	323	0	189	10	36
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	20.0	32.4	32.4	12.0	24.4	0.0	13.0	20.6	0.0	15.0	22.6	22.6
Total Split (%)	25.0%	40.5%	40.5%	15.0%	30.5%	0.0%	16.3%	25.8%	0.0%	18.8%	28.3%	28.3%
Maximum Green (s)	15.4	27.8	27.8	7.4	19.8		8.4	16.0		10.4	18.0	18.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	19.3	36.1	36.1	10.0	24.6		9.0	9.2		10.9	11.1	11.1
Actuated g/C Ratio	0.24	0.45	0.45	0.12	0.31		0.11	0.12		0.14	0.14	0.14
v/c Ratio	0.74	0.57	0.02	0.52	0.70		0.85	0.72		0.82	0.04	0.15
Control Delay	41.4	22.2	8.6	51.8	27.2		73.5	14.0		44.6	14.7	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	41.4	22.2	8.6	51.8	27.2		73.5	14.0		44.6	14.7	10.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	C		E	B		D	B	B
Approach Delay		29.4			32.7			33.9			38.1	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	129	166	0	60	127		81	5		99	5	4
Queue Length 95th (ft)	#289	302	12	m#115	#312		#187	71		#205	m9	m24
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	410	802	690	216	550		190	563		232	413	378
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.57	0.02	0.51	0.70		0.85	0.57		0.81	0.02	0.10

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 18 (23%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 32.4 Intersection LOS: C
Intersection Capacity Utilization 75.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Mitigated 2008 Project Alt A AM
9: Avenue 12 & SR 99 NB ramps 7/21/2006

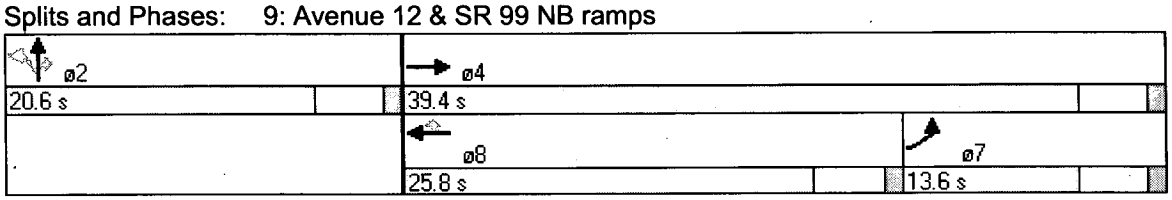
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						425			89			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	104	494	0	0	249	374	155	4	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	118	561	0	0	283	425	176	5	89	0	0	0
Lane Group Flow (vph)	118	561	0	0	283	425	0	181	89	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	13.6	39.4	0.0	0.0	25.8	25.8	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	22.7%	65.7%	0.0%	0.0%	43.0%	43.0%	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	9.0	34.8			21.2	21.2	16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	39.9			29.0	29.0		12.1	12.1			
Actuated g/C Ratio	0.15	0.66			0.48	0.48		0.20	0.20			
v/c Ratio	0.45	0.46			0.32	0.44		0.55	0.25			
Control Delay	24.3	4.4			13.2	3.3		27.3	6.7			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	24.3	4.4			13.2	3.3		27.3	6.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		C	A			
Approach Delay		7.9			7.3			20.5				
Approach LOS		A			A			C				
Queue Length 50th (ft)	40	59			65	0		59	0			
Queue Length 95th (ft)	m67	97			129	46		100	26			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	280	1226			883	970		448	463			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.42	0.46			0.32	0.44		0.40	0.19			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 9.7 Intersection LOS: A
Intersection Capacity Utilization 47.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



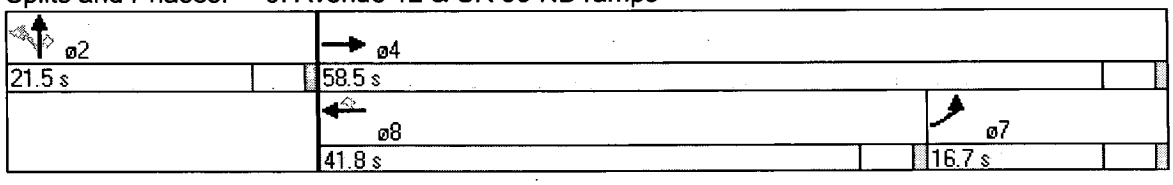
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						542			149			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	114	766	0	0	280	477	174	1	131	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	130	870	0	0	318	542	198	1	149	0	0	0
Lane Group Flow (vph)	130	870	0	0	318	542	0	199	149	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	16.7	58.5	0.0	0.0	41.8	41.8	21.5	21.5	21.5	0.0	0.0	0.0
Total Split (%)	20.9%	73.1%	0.0%	0.0%	52.3%	52.3%	26.9%	26.9%	26.9%	0.0%	0.0%	0.0%
Maximum Green (s)	12.1	53.9			37.2	37.2	16.9	16.9	16.9			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	11.6	57.5			44.2	44.2		14.5	14.5			
Actuated g/C Ratio	0.14	0.72			0.55	0.55		0.18	0.18			
v/c Ratio	0.52	0.67			0.32	0.50		0.66	0.38			
Control Delay	30.1	4.8			12.9	3.0		41.1	8.0			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	30.1	4.8			12.9	3.0		41.1	8.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		D	A			
Approach Delay		8.1			6.7			26.9				
Approach LOS		A			A			C				
Queue Length 50th (ft)	54	48			90	0		93	0			
Queue Length 95th (ft)	m87	121			152	45		151	43			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	273	1302			1000	1092		363	441			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.48	0.67			0.32	0.50		0.55	0.34			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 15 (19%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 10.5 Intersection LOS: B
Intersection Capacity Utilization 56.7% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	Mitigated 2008 Project AM		

Project Description 04-837.1 Alt A

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	169	2	86	160	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	8	8	1	14	46
Percent Heavy Vehicles	11	–	–	19	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	8	8	1	13	43
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	93	173	2	16	183	2
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	16	93		61			19	
C (m) (veh/h)	1349	1294		667			501	
v/c	0.01	0.07		0.09			0.04	
95% queue length	0.04	0.23		0.30			0.12	
Control Delay (s/veh)	7.7	8.0		10.9			12.5	
LOS	A	A		B			B	
Approach Delay (s/veh)	–	–	10.9			12.5		
Approach LOS	–	–	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 7/21/2006 8:06 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	Mitigated 2008 Project PM		

Project Description 04-837.1 Alt A

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	236	4	113	253	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	11	5	2	10	116
Percent Heavy Vehicles	13	–	–	15	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	11	5	2	10	107
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	122	274	1	15	256	4
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	15	122		128			17	
C (m) (veh/h)	1227	1233		671			337	
v/c	0.01	0.10		0.19			0.05	
95% queue length	0.04	0.33		0.70			0.16	
Control Delay (s/veh)	8.0	8.2		11.6			16.2	
LOS	A	A		B			C	
Approach Delay (s/veh)	–	–	11.6			16.2		
Approach LOS	–	–	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 7/21/2006 8:09 PM

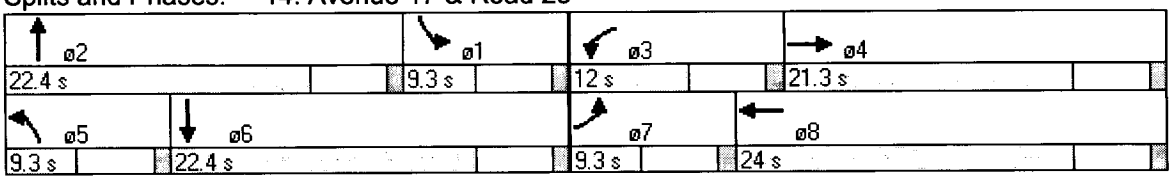
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.974			0.944			0.945			0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1814	0	1770	1758	0	1770	1760	0	1770	1861	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1814	0	1770	1758	0	1770	1760	0	1770	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			12			45			1	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	3	44	9	109	18	11	5	182	107	23	123	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	48	10	118	20	12	5	198	116	25	134	1
Lane Group Flow (vph)	3	58	0	118	32	0	5	314	0	25	135	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	12.0	24.0	0.0	9.3	22.4	0.0	9.3	22.4	0.0
Total Split (%)	14.3%	32.8%	0.0%	18.5%	36.9%	0.0%	14.3%	34.5%	0.0%	14.3%	34.5%	0.0%
Maximum Green (s)	4.0	16.0		6.7	18.7		4.0	17.1		4.0	17.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.1	9.6		9.7	14.3		6.1	36.2		6.1	36.2	
Actuated g/C Ratio	0.09	0.14		0.15	0.22		0.09	0.58		0.09	0.58	
v/c Ratio	0.02	0.22		0.44	0.08		0.03	0.30		0.16	0.12	
Control Delay	23.7	17.7		23.0	10.9		23.8	9.3		25.3	9.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.7	17.7		23.0	10.9		23.8	9.3		25.3	9.4	
LOS	C	B		C	B		C	A		C	A	
Approach Delay		18.0			20.4			9.5			11.9	
Approach LOS		B			C			A			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	1	7		18	3		1	22		4	10	
Queue Length 95th (ft)	8	41		82	24		10	142		28	70	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	155	462		269	585		155	1047		155	1088	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.02	0.13		0.44	0.05		0.03	0.30		0.16	0.12	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 62
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 38.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 14: Avenue 17 & Road 23



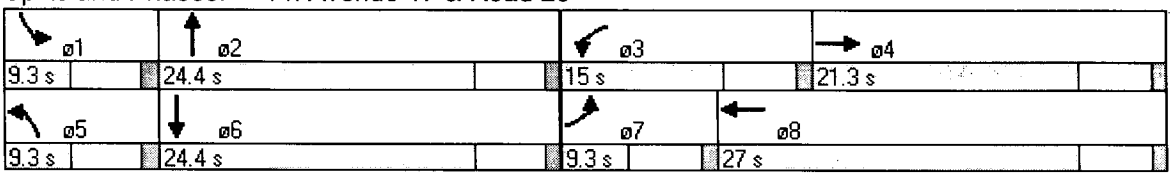
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.944			0.919			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1809	0	1770	1758	0	1770	1712	0	1770	1853	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1809	0	1770	1758	0	1770	1712	0	1770	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			33			85			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	7	84	20	205	51	30	6	194	226	37	194	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	91	22	223	55	33	7	211	246	40	211	7
Lane Group Flow (vph)	8	113	0	223	88	0	7	457	0	40	218	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	15.0	27.0	0.0	9.3	24.4	0.0	9.3	24.4	0.0
Total Split (%)	13.3%	30.4%	0.0%	21.4%	38.6%	0.0%	13.3%	34.9%	0.0%	13.3%	34.9%	0.0%
Maximum Green (s)	4.0	16.0		9.7	21.7		4.0	19.1		4.0	19.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	10.1		10.9	21.1		5.3	25.6		5.3	27.3	
Actuated g/C Ratio	0.08	0.16		0.18	0.35		0.08	0.43		0.08	0.46	
v/c Ratio	0.06	0.37		0.69	0.14		0.05	0.59		0.28	0.26	
Control Delay	30.0	22.1		36.7	10.1		30.0	18.1		33.2	13.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.0	22.1		36.7	10.1		30.0	18.1		33.2	13.8	
LOS	C	C		D	B		C	B		C	B	
Approach Delay		22.6			29.2			18.3			16.8	
Approach LOS		C			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	2	26		64	9		2	88		12	45	
Queue Length 95th (ft)	15	73		#189	46		14	#279		43	122	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	140	471		328	705		140	780		144	846	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.24		0.68	0.12		0.05	0.59		0.28	0.26	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 59.9
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 21.3 Intersection LOS: C
Intersection Capacity Utilization 55.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



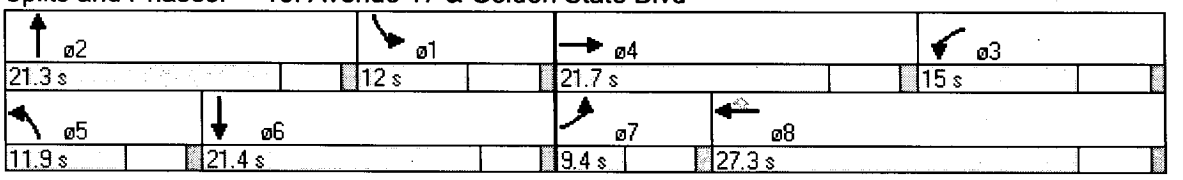
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.983				0.850		0.895			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3479	0	1736	3471	1553	1492	1405	0	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3479	0	1736	3471	1553	1492	1405	0	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18				435		113			17	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	26	392	49	140	545	400	61	45	104	203	24	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	28	426	53	152	592	435	66	49	113	221	26	17
Lane Group Flow (vph)	28	479	0	152	592	435	66	162	0	221	43	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.4	21.7	0.0	15.0	27.3	27.3	11.9	21.3	0.0	12.0	21.4	0.0
Total Split (%)	13.4%	31.0%	0.0%	21.4%	39.0%	39.0%	17.0%	30.4%	0.0%	17.1%	30.6%	0.0%
Maximum Green (s)	4.1	16.4		9.7	22.0	22.0	7.3	16.7		6.7	16.8	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.4	17.7		11.0	28.9	28.9	7.3	17.3		8.0	22.2	
Actuated g/C Ratio	0.08	0.25		0.16	0.41	0.41	0.10	0.25		0.11	0.32	
v/c Ratio	0.20	0.54		0.56	0.41	0.48	0.42	0.38		0.56	0.08	
Control Delay	34.1	24.3		28.1	10.7	4.3	37.9	11.0		35.5	14.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	34.1	24.3		28.1	10.7	4.3	37.9	11.0		35.5	14.7	
LOS	C	C		C	B	A	D	B		D	B	
Approach Delay		24.9			10.6			18.8			32.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	12	90		46	34	2	27	16		47	9	
Queue Length 95th (ft)	35	134		107	135	94	63	62		79	31	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	137	893		273	1435	897	168	432		392	567	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.20	0.54		0.56	0.41	0.48	0.39	0.38		0.56	0.08	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 1 (1%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 17.4 Intersection LOS: B
Intersection Capacity Utilization 48.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 15: Avenue 17 & Golden State Blvd



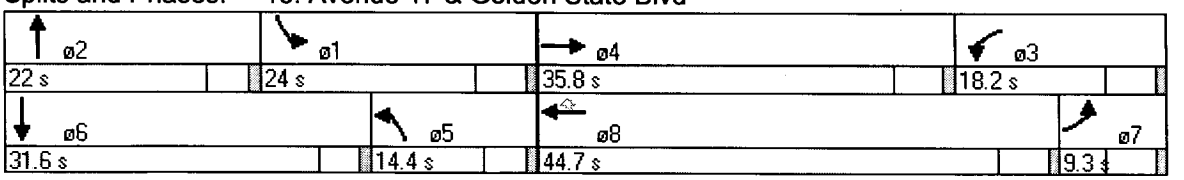
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.987				0.850		0.894			0.946	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3493	0	1656	3312	1482	1736	1633	0	3433	1762	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3493	0	1656	3312	1482	1736	1633	0	3433	1762	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				638		106			28	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	38	875	84	212	819	587	76	101	245	608	61	34
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	41	951	91	230	890	638	83	110	266	661	66	37
Lane Group Flow (vph)	41	1042	0	230	890	638	83	376	0	661	103	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	35.8	0.0	18.2	44.7	44.7	14.4	22.0	0.0	24.0	31.6	0.0
Total Split (%)	9.3%	35.8%	0.0%	18.2%	44.7%	44.7%	14.4%	22.0%	0.0%	24.0%	31.6%	0.0%
Maximum Green (s)	4.0	30.5		12.9	39.4	39.4	9.8	17.4		18.7	27.0	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead	Lead	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	31.8		14.2	44.4	44.4	9.6	18.0		20.0	30.5	
Actuated g/C Ratio	0.05	0.32		0.14	0.44	0.44	0.10	0.18		0.20	0.30	
v/c Ratio	0.44	0.93		0.98	0.61	0.63	0.50	0.99		0.96	0.18	
Control Delay	60.6	48.3		76.5	13.9	4.9	53.1	73.9		66.8	21.3	
Queue Delay	0.0	0.0		0.0	0.2	1.1	0.0	0.0		0.0	0.0	
Total Delay	60.6	48.3		76.5	14.1	5.9	53.1	73.9		66.8	21.3	
LOS	E	D		E	B	A	D	E		E	C	
Approach Delay		48.8			19.3			70.1			60.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			B			E			E	
Queue Length 50th (ft)	26	333		147	193	61	51	179		217	36	
Queue Length 95th (ft)	#61	#466		m#235	232	93	100	#370		#330	79	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	94	1118		235	1471	1013	181	381		687	557	
Starvation Cap Reductn	0	0		0	101	172	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.44	0.93		0.98	0.65	0.76	0.46	0.99		0.96	0.18	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 24 (24%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 40.7 Intersection LOS: D
Intersection Capacity Utilization 89.7% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



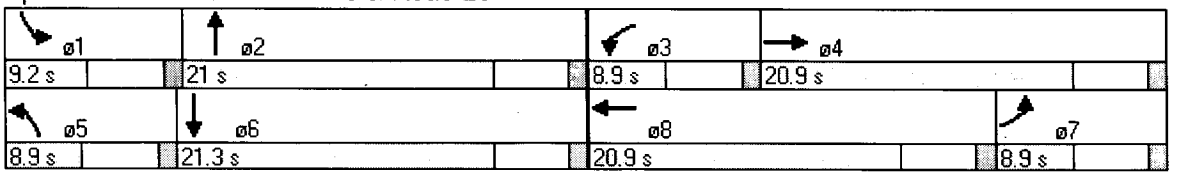
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.878			0.850			0.998			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1545	0	1671	1495	0	1770	3532	0	1770	3518	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1545	0	1671	1495	0	1770	3532	0	1770	3518	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			313			2			7	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	30	3	12	16	0	110	27	662	10	82	359	15
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
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	33	3	13	17	0	120	29	720	11	89	390	16
Lane Group Flow (vph)	33	16	0	17	120	0	29	731	0	89	406	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	8.9	20.9	0.0	8.9	20.9	0.0	8.9	21.0	0.0	9.2	21.3	0.0
Total Split (%)	14.8%	34.8%	0.0%	14.8%	34.8%	0.0%	14.8%	35.0%	0.0%	15.3%	35.5%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	16.1		4.3	16.4	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.2	10.4		5.8	7.8		5.8	35.1		6.4	40.1	
Actuated g/C Ratio	0.10	0.17		0.09	0.13		0.09	0.61		0.10	0.70	
v/c Ratio	0.20	0.06		0.11	0.26		0.18	0.34		0.48	0.17	
Control Delay	22.8	11.0		23.7	1.4		24.7	9.7		28.3	6.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.8	11.0		23.7	1.4		24.7	9.7		28.3	6.2	
LOS	C	B		C	A		C	A		C	A	
Approach Delay		19.0			4.1			10.3			10.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			A			B			B	
Queue Length 50th (ft)	6	1		3	0		6	59		18	13	
Queue Length 95th (ft)	29	14		19	0		28	141		#70	74	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	165	448		151	635		160	2188		184	2458	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.20	0.04		0.11	0.19		0.18	0.33		0.48	0.17	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 57.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 10.0 Intersection LOS: A
Intersection Capacity Utilization 41.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



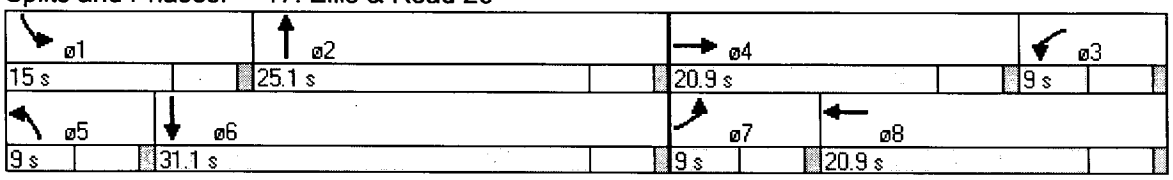
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.931			0.853			0.985			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1734	0	1770	1589	0	1770	3486	0	1770	3490	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1734	0	1770	1589	0	1770	3486	0	1770	3490	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			208			17			18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	40	12	10	48	4	191	39	653	70	177	927	97
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	13	11	52	4	208	42	710	76	192	1008	105
Lane Group Flow (vph)	43	24	0	52	212	0	42	786	0	192	1113	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	9.0	20.9	0.0	9.0	25.1	0.0	15.0	31.1	0.0
Total Split (%)	12.9%	29.9%	0.0%	12.9%	29.9%	0.0%	12.9%	35.9%	0.0%	21.4%	44.4%	0.0%
Maximum Green (s)	4.1	16.0		4.1	16.0		4.1	20.2		10.1	26.2	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	7.3		8.2	8.2		5.0	24.9		10.3	33.6	
Actuated g/C Ratio	0.09	0.13		0.14	0.15		0.09	0.47		0.19	0.64	
v/c Ratio	0.28	0.10		0.21	0.51		0.27	0.47		0.58	0.50	
Control Delay	31.9	20.6		24.2	9.2		31.7	15.2		29.4	10.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.9	20.6		24.2	9.2		31.7	15.2		29.4	10.4	
LOS	C	C		C	A		C	B		C	B	
Approach Delay		27.8			12.2			16.1			13.2	
Approach LOS		C			B			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	11	3		13	1		11	85		44	51	
Queue Length 95th (ft)	45	24		48	51		44	198		#152	265	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	154	459		251	581		154	1755		358	2235	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.28	0.05		0.21	0.36		0.27	0.45		0.54	0.50	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 52.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 60.7% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.958			0.985			0.950	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1757	0	1626	1640	0	1504	1560	0	1570	1570	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1757	0	1626	1640	0	1504	1560	0	1570	1570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			28			8			36	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	12	125	29	10	115	45	18	135	15	28	83	41
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	13	136	32	11	125	49	20	147	16	30	90	45
Lane Group Flow (vph)	13	168	0	11	174	0	20	163	0	30	135	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	11.3	23.3	0.0	11.3	23.3	0.0	11.3	23.4	0.0	12.0	24.1	0.0
Total Split (%)	16.1%	33.3%	0.0%	16.1%	33.3%	0.0%	16.1%	33.4%	0.0%	17.1%	34.4%	0.0%
Maximum Green (s)	6.0	18.0		6.0	18.0		6.0	18.1		6.7	18.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	7.3	11.8		7.3	11.7		7.3	28.4		7.6	30.8	
Actuated g/C Ratio	0.12	0.22		0.12	0.22		0.12	0.55		0.13	0.59	
v/c Ratio	0.06	0.42		0.06	0.46		0.11	0.19		0.15	0.14	
Control Delay	26.3	18.4		26.3	18.3		27.1	12.3		24.8	8.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.3	18.4		26.3	18.3		27.1	12.3		24.8	8.4	
LOS	C	B		C	B		C	B		C	A	
Approach Delay		19.0			18.8			13.9			11.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	2	25		2	25		4	14		5	9	
Queue Length 95th (ft)	20	101		18	101		26	100		34	72	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	213	587		201	556		186	858		220	949	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.29		0.05	0.31		0.11	0.19		0.14	0.14	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 51.8
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 15.9 Intersection LOS: B
Intersection Capacity Utilization 31.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
12 s	23.4 s	11.3 s	23.3 s
ø5	ø6	ø7	ø8
11.3 s	24.1 s	11.3 s	23.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.945			0.988			0.974	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1673	0	1736	1726	0	1703	1771	0	1556	1595	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1673	0	1736	1726	0	1703	1771	0	1556	1595	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			44			7			17	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	34	95	46	19	160	94	51	223	20	75	229	49
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	37	103	50	21	174	102	55	242	22	82	249	53
Lane Group Flow (vph)	37	153	0	21	276	0	55	264	0	82	302	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.4	0.0	11.0	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	36.0%	0.0%	16.9%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.1		5.7	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	14.6		5.4	13.0		5.4	24.3		7.1	25.2	
Actuated g/C Ratio	0.09	0.27		0.09	0.24		0.09	0.44		0.12	0.46	
v/c Ratio	0.25	0.32		0.14	0.62		0.35	0.33		0.44	0.41	
Control Delay	31.9	14.3		31.3	22.4		33.1	15.8		33.4	15.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.9	14.3		31.3	22.4		33.1	15.8		33.4	15.5	
LOS	C	B		C	C		C	B		C	B	
Approach Delay		17.7			23.0			18.8			19.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			B			B	
Queue Length 50th (ft)	11	28		6	60		16	55		23	60	
Queue Length 95th (ft)	40	80		27	147		53	147		#77	165	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	148	572		151	546		157	789		187	744	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.25	0.27		0.14	0.51		0.35	0.33		0.44	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 54.8
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 19.9 Intersection LOS: B
Intersection Capacity Utilization 49.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
11 s	23.4 s	9.3 s	21.3 s
ø5	**ø6**	**ø7**	**ø8**
9.3 s	25.1 s	9.3 s	21.3 s

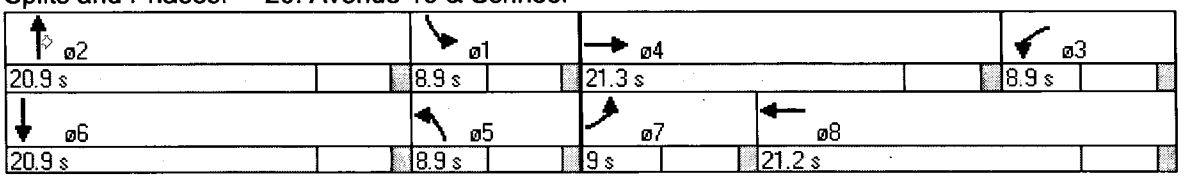
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.899			0.973				0.850		0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1675	0	3400	1795	0	1770	1863	1583	1327	1273	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1675	0	3400	1795	0	1770	1863	1583	1327	1273	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50			11				103		29	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		334			571			552			643	
Travel Time (s)		5.7			9.7			9.4			11.0	
Volume (vph)	258	22	46	212	47	10	52	8	95	4	18	27
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
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	36%	36%	36%
Adj. Flow (vph)	280	24	50	230	51	11	57	9	103	4	20	29
Lane Group Flow (vph)	280	74	0	230	62	0	57	9	103	4	49	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9	20.9	8.9	20.9	
Total Split (s)	9.0	21.3	0.0	8.9	21.2	0.0	8.9	20.9	20.9	8.9	20.9	0.0
Total Split (%)	15.0%	35.5%	0.0%	14.8%	35.3%	0.0%	14.8%	34.8%	34.8%	14.8%	34.8%	0.0%
Maximum Green (s)	4.1	16.4		4.0	16.3		4.0	16.0	16.0	4.0	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	9.8	27.2		4.9	22.3		8.4	12.8	12.8	7.4	7.7	
Actuated g/C Ratio	0.16	0.45		0.08	0.37		0.14	0.21	0.21	0.12	0.13	
v/c Ratio	0.50	0.09		0.83	0.09		0.23	0.02	0.25	0.02	0.26	
Control Delay	30.0	7.5		41.7	4.7		24.4	17.6	6.8	22.0	16.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	30.0	7.5		41.7	4.7		24.4	17.6	6.8	22.0	16.8	
LOS	C	A		D	A		C	B	A	C	B	
Approach Delay		25.3			33.8			13.3			17.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	46	5		45	4		19	2	0	1	7	
Queue Length 95th (ft)	#114	31		#88	m14		45	13	35	8	31	
Internal Link Dist (ft)		254			491			472			563	
Turn Bay Length (ft)												
Base Capacity (vph)	560	787		278	675		247	571	557	164	379	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.50	0.09		0.83	0.09		0.23	0.02	0.18	0.02	0.13	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 48 (80%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 25.3 Intersection LOS: C
Intersection Capacity Utilization 30.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Avenue 16 & Schnoor



Mitigated 2008 Project Alt A PM
20: Avenue 16 & Schnoor 7/21/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.892			0.965				0.850		0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1662	0	3433	1798	0	1597	1681	1429	1770	1699	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1662	0	3433	1798	0	1597	1681	1429	1770	1699	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		122			21				236		41	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		334			571			552			643	
Travel Time (s)		5.7			9.7			9.4			11.0	
Volume (vph)	323	43	112	521	82	25	88	15	217	8	27	38
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	351	47	122	566	89	27	96	16	236	9	29	41
Lane Group Flow (vph)	351	169	0	566	116	0	96	16	236	9	70	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9	20.9	8.9	20.9	
Total Split (s)	16.5	22.1	0.0	17.0	22.6	0.0	10.0	22.0	22.0	8.9	20.9	0.0
Total Split (%)	23.6%	31.6%	0.0%	24.3%	32.3%	0.0%	14.3%	31.4%	31.4%	12.7%	29.9%	0.0%
Maximum Green (s)	11.6	17.2		12.1	17.7		5.1	17.1	17.1	4.0	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	12.5	22.6		19.0	29.1		6.0	14.6	14.6	4.9	8.4	
Actuated g/C Ratio	0.18	0.32		0.27	0.42		0.09	0.21	0.21	0.07	0.12	
v/c Ratio	0.57	0.27		0.61	0.15		0.70	0.05	0.49	0.07	0.29	
Control Delay	30.5	8.8		12.7	4.9		60.2	21.6	7.5	31.9	17.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	30.5	8.8		12.7	4.9		60.2	21.6	7.5	31.9	17.4	
LOS	C	A		B	A		E	C	A	C	B	
Approach Delay		23.5			11.4			22.7			19.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			C			B	
Queue Length 50th (ft)	72	15		43	9		41	5	0	4	12	
Queue Length 95th (ft)	111	60		75	m20		#112	20	53	17	42	
Internal Link Dist (ft)		254			491			472			563	
Turn Bay Length (ft)												
Base Capacity (vph)	613	619		934	761		137	435	545	124	441	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.57	0.27		0.61	0.15		0.70	0.04	0.43	0.07	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 66 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 18.0 Intersection LOS: B
Intersection Capacity Utilization 45.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Avenue 16 & Schnoor

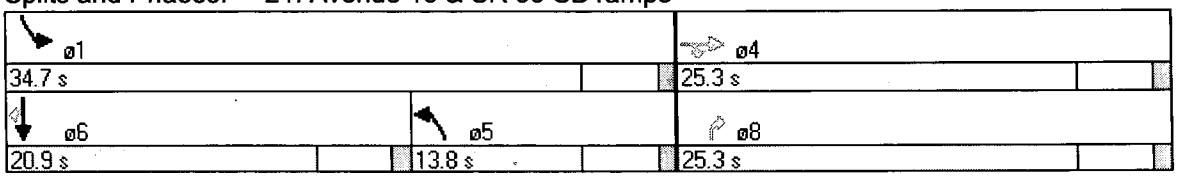
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1845	1568	0	0	0	3072	0	1417	1703	1792	1524
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1845	1568	0	0	0	3072	0	1417	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			418						7	2		217
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		571			228			1041			580	
Travel Time (s)		9.7			5.2			17.7			13.2	
Volume (vph)	0	130	385	0	0	0	239	0	6	2	108	200
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
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	14%	14%	14%	6%	6%	6%
Adj. Flow (vph)	0	141	418	0	0	0	260	0	7	2	117	217
Lane Group Flow (vph)	0	141	418	0	0	0	260	0	7	2	117	217
Turn Type			custom				Prot		custom	Prot		Perm
Protected Phases							5			1	6	
Permitted Phases		4	4						8			6
Detector Phases		4	4				5		8	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				8.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	25.3	25.3	0.0	0.0	0.0	13.8	0.0	25.3	34.7	20.9	20.9
Total Split (%)	0.0%	42.2%	42.2%	0.0%	0.0%	0.0%	23.0%	0.0%	42.2%	57.8%	34.8%	34.8%
Maximum Green (s)		20.4	20.4				8.9		20.4	29.8	16.0	16.0
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		C-Max	C-Max				None		C-Max	None	None	None
Walk Time (s)		5.0	5.0						5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0						11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0						0		0	0
Act Effct Green (s)		27.0	27.0				11.2		27.0	11.3	9.8	9.8
Actuated g/C Ratio		0.45	0.45				0.19		0.45	0.19	0.16	0.16
v/c Ratio		0.17	0.45				0.45		0.01	0.01	0.40	0.50
Control Delay		11.9	3.2				19.1		15.0	9.5	25.8	8.1
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		11.9	3.2				19.1		15.0	9.5	25.8	8.1
LOS		B	A				B		B	A	C	A
Approach Delay		5.4									14.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A									B	
Queue Length 50th (ft)		29	0				48		1	0	38	0
Queue Length 95th (ft)		64	39				63		m8	3	75	47
Internal Link Dist (ft)		491			148			961			500	
Turn Bay Length (ft)												
Base Capacity (vph)		829	935				590		640	872	505	585
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.17	0.45				0.44		0.01	0.00	0.23	0.37

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 4:EBT and 8:NBR, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 11.1 Intersection LOS: B
Intersection Capacity Utilization 36.2% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1863	1583	0	0	0	3433	0	1583	1736	1827	1553
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	0	0	3433	0	1583	1736	1827	1553
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			698						11	3		514
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		571			228			1041			580	
Travel Time (s)		9.7			5.2			17.7			13.2	
Volume (vph)	0	285	680	0	0	0	524	0	10	3	196	473
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	310	739	0	0	0	570	0	11	3	213	514
Lane Group Flow (vph)	0	310	739	0	0	0	570	0	11	3	213	514
Turn Type			custom				Prot		custom	Prot		Perm
Protected Phases							5			1	6	
Permitted Phases		4	4						8			6
Detector Phases		4	4				5		8	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				8.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	29.0	29.0	0.0	0.0	0.0	19.0	0.0	29.0	41.0	22.0	22.0
Total Split (%)	0.0%	41.4%	41.4%	0.0%	0.0%	0.0%	27.1%	0.0%	41.4%	58.6%	31.4%	31.4%
Maximum Green (s)		24.1	24.1				14.1		24.1	36.1	17.1	17.1
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		C-Max	C-Max				None		C-Max	None	None	None
Walk Time (s)		5.0	5.0						5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0						11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0						0		0	0
Act Effct Green (s)		27.9	27.9				15.8		27.9	12.5	14.3	14.3
Actuated g/C Ratio		0.40	0.40				0.23		0.40	0.18	0.20	0.20
v/c Ratio		0.42	0.70				0.74		0.02	0.01	0.57	0.71
Control Delay		18.7	6.6				22.4		11.0	10.3	30.5	8.4
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		18.7	6.6				22.4		11.0	10.3	30.5	8.4
LOS		B	A				C		B	B	C	A
Approach Delay		10.2									14.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B									B	
Queue Length 50th (ft)		100	11				96		2	0	83	0
Queue Length 95th (ft)		172	120				#146		m4	3	137	71
Internal Link Dist (ft)		491			148			961			500	
Turn Bay Length (ft)												
Base Capacity (vph)		742	1051				781		637	919	470	781
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.42	0.70				0.73		0.02	0.00	0.45	0.66

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 56 (80%), Referenced to phase 4:EBT and 8:NBR, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 14.6 Intersection LOS: B
Intersection Capacity Utilization 59.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps

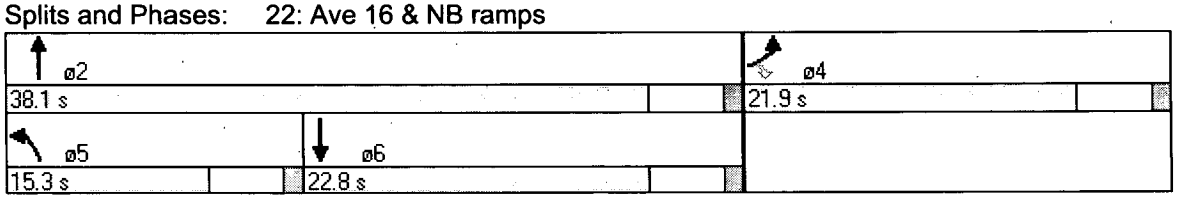
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.871	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3367	1553	1656	1743	1547	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3367	1553	1656	1743	1547	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		227			145	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1041			475	543	
Travel Time (s)	23.7			10.8	12.3	
Volume (vph)	284	209	112	151	6	133
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	9%	9%	7%	7%
Adj. Flow (vph)	309	227	122	164	7	145
Lane Group Flow (vph)	309	227	122	164	152	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Detector Phases	4	4	5	2	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.9	20.9	8.9	20.9	20.9	
Total Split (s)	21.9	21.9	15.3	38.1	22.8	0.0
Total Split (%)	36.5%	36.5%	25.5%	63.5%	38.0%	0.0%
Maximum Green (s)	17.0	17.0	10.4	33.2	17.9	
Yellow Time (s)	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Min	C-Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	13.4	13.4	10.6	38.6	26.1	
Actuated g/C Ratio	0.22	0.22	0.18	0.64	0.44	
v/c Ratio	0.41	0.43	0.42	0.15	0.20	
Control Delay	17.3	4.7	25.4	5.2	4.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.3	4.7	25.4	5.2	4.5	
LOS	B	A	C	A	A	
Approach Delay	12.0			13.8	4.5	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			B	A	
Queue Length 50th (ft)	36	0	40	22	2	
Queue Length 95th (ft)	74	34	75	43	37	
Internal Link Dist (ft)	961			395	463	
Turn Bay Length (ft)						
Base Capacity (vph)	1004	623	336	1121	760	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.31	0.36	0.36	0.15	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 40 (67%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.43
Intersection Signal Delay: 11.4 Intersection LOS: B
Intersection Capacity Utilization 32.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 22: Ave 16 & NB ramps



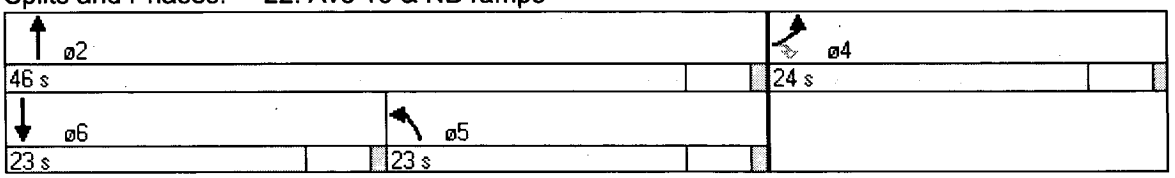
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.869	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3347	1534	1643	1729	1531	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3347	1534	1643	1729	1531	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		464			325	
Headway Factor	1.01	1.02	1.01	1.01	1.01	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1041			475	543	
Travel Time (s)	23.7			10.8	12.3	
Volume (vph)	449	427	235	222	10	299
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	9%	9%	7%	7%
Bus Blockages (#/hr)	3	3	2	2	2	2
Adj. Flow (vph)	488	464	255	241	11	325
Lane Group Flow (vph)	488	464	255	241	336	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Detector Phases	4	4	5	2	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.9	20.9	8.9	20.9	20.9	
Total Split (s)	24.0	24.0	23.0	46.0	23.0	0.0
Total Split (%)	34.3%	34.3%	32.9%	65.7%	32.9%	0.0%
Maximum Green (s)	19.1	19.1	18.1	41.1	18.1	
Yellow Time (s)	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Min	C-Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	17.5	17.5	16.4	44.5	24.1	
Actuated g/C Ratio	0.25	0.25	0.23	0.64	0.34	
v/c Ratio	0.58	0.63	0.66	0.22	0.45	
Control Delay	23.4	5.8	32.1	6.9	5.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.4	5.8	32.1	6.9	5.7	
LOS	C	A	C	A	A	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	14.8			19.8	5.7	
Approach LOS	B			B	A	
Queue Length 50th (ft)	63	0	100	50	4	
Queue Length 95th (ft)	148	123	153	75	65	
Internal Link Dist (ft)	961			395	463	
Turn Bay Length (ft)						
Base Capacity (vph)	995	782	462	1120	757	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.49	0.59	0.55	0.22	0.44	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 54.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 22: Ave 16 & NB ramps



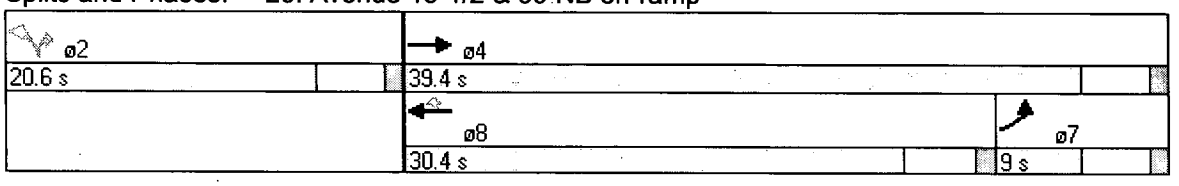
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						220			196			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	127	711	0	0	1025	202	344	0	184	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	138	773	0	0	1114	220	374	0	200	0	0	0
Lane Group Flow (vph)	138	773	0	0	1114	220	374	0	200	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	9.0	39.4	0.0	0.0	30.4	30.4	20.6	0.0	20.6	0.0	0.0	0.0
Total Split (%)	15.0%	65.7%	0.0%	0.0%	50.7%	50.7%	34.3%	0.0%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	4.4	34.8			25.8	25.8	16.0		16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	5.0	39.3			32.1	32.1	12.7		12.7			
Actuated g/C Ratio	0.08	0.66			0.54	0.54	0.21		0.21			
v/c Ratio	0.48	0.33			0.60	0.24	0.54		0.42			
Control Delay	31.8	2.2			12.7	2.5	23.6		6.5			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	31.8	2.2			12.7	2.5	23.6		6.5			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A	C		A			
Approach Delay		6.7			11.0							
Approach LOS		A			B							
Queue Length 50th (ft)	29	32			140	0	62		1			
Queue Length 95th (ft)	55	43			233	31	90		42			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	286	2317			1856	933	897		555			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.48	0.33			0.60	0.24	0.42		0.36			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 1 (2%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 11.0 Intersection LOS: B
Intersection Capacity Utilization 51.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Mitigated 2008 Project Alt A PM
23: Avenue 15-1/2 & 99 NB on-ramp

7/21/2006

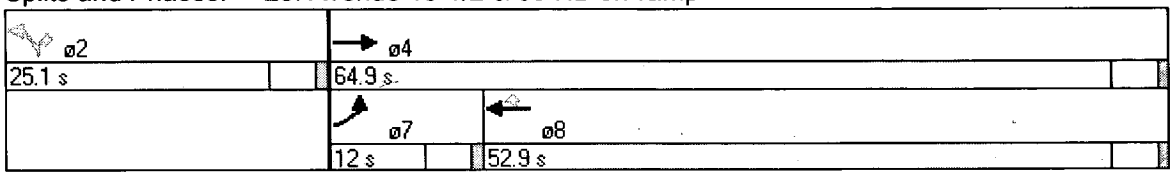
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						387			22			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	242	1783	0	0	1679	356	699	0	311	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	263	1938	0	0	1825	387	760	0	338	0	0	0
Lane Group Flow (vph)	263	1938	0	0	1825	387	760	0	338	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	12.0	64.9	0.0	0.0	52.9	52.9	25.1	0.0	25.1	0.0	0.0	0.0
Total Split (%)	13.3%	72.1%	0.0%	0.0%	58.8%	58.8%	27.9%	0.0%	27.9%	0.0%	0.0%	0.0%
Maximum Green (s)	7.4	60.3			48.3	48.3	20.5		20.5			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	8.0	60.9			48.9	48.9	21.1		21.1			
Actuated g/C Ratio	0.09	0.68			0.54	0.54	0.23		0.23			
v/c Ratio	0.86	0.81			0.95	0.37	0.95		0.88			
Control Delay	65.5	3.9			31.9	2.3	57.6		56.7			
Queue Delay	0.0	0.7			0.8	0.0	0.0		0.0			
Total Delay	65.5	4.6			32.8	2.3	57.6		56.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			C	A	E		E			
Approach Delay		11.9			27.4							
Approach LOS		B			C							
Queue Length 50th (ft)	83	127			484	0	220		175			
Queue Length 95th (ft)	m#101	128			#679	39	#335		#331			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	305	2395			1923	1037	797		384			
Starvation Cap Reductn	0	184			0	0	0		0			
Spillback Cap Reductn	0	0			21	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.86	0.88			0.96	0.37	0.95		0.88			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 10 (11%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 123.2% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Mitigated 2008 Project Alt A AM
24: Avenue 15-1/2 & 99 SB off-ramp 7/21/2006

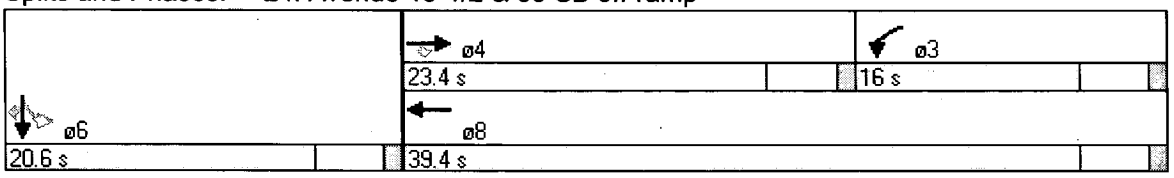
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			385									92
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	674	354	361	1008	0	0	0	0	169	1	85
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	733	385	392	1096	0	0	0	0	184	1	92
Lane Group Flow (vph)	0	733	385	392	1096	0	0	0	0	92	93	92
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	23.4	23.4	16.0	39.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	39.0%	39.0%	26.7%	65.7%	0.0%	0.0%	0.0%	0.0%	34.3%	34.3%	34.3%
Maximum Green (s)		18.8	18.8	11.4	34.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		26.9	26.9	12.0	42.9					9.1	9.1	9.1
Actuated g/C Ratio		0.45	0.45	0.20	0.72					0.15	0.15	0.15
v/c Ratio		0.46	0.42	0.58	0.44					0.36	0.37	0.29
Control Delay		13.2	3.1	19.4	1.4					26.2	26.2	8.2
Queue Delay		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Total Delay		13.2	3.1	19.4	1.4					26.2	26.2	8.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B	A	B	A					C	C	A
Approach Delay		9.7			6.2						20.2	
Approach LOS		A			A						C	
Queue Length 50th (ft)		91	0	71	0					31	32	0
Queue Length 95th (ft)		147	45	91	20					66	67	31
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1589	923	673	2484					465	466	505
Starvation Cap Reductn		0	0	0	0					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.46	0.42	0.58	0.44					0.20	0.20	0.18

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 8.9 Intersection LOS: A
Intersection Capacity Utilization 51.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



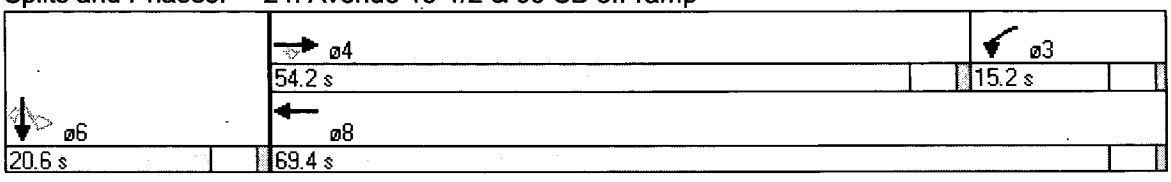
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			625									15
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1601	575	296	2082	0	0	0	0	410	1	203
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1740	625	322	2263	0	0	0	0	446	1	221
Lane Group Flow (vph)	0	1740	625	322	2263	0	0	0	0	223	224	221
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	54.2	54.2	15.2	69.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	60.2%	60.2%	16.9%	77.1%	0.0%	0.0%	0.0%	0.0%	22.9%	22.9%	22.9%
Maximum Green (s)		49.6	49.6	10.6	64.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		51.4	51.4	11.2	66.6					15.4	15.4	15.4
Actuated g/C Ratio		0.57	0.57	0.12	0.74					0.17	0.17	0.17
v/c Ratio		0.86	0.53	0.75	0.86					0.78	0.78	0.78
Control Delay		22.4	2.7	38.5	7.6					54.7	54.8	53.0
Queue Delay		0.1	0.0	0.0	1.6					0.0	0.0	0.0
Total Delay		22.5	2.7	38.5	9.3					54.7	54.8	53.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	D	A					D	D	D
Approach Delay		17.2			12.9						54.2	
Approach LOS		B			B						D	
Queue Length 50th (ft)		422	0	91	227					126	127	111
Queue Length 95th (ft)		541	45	m94	m247					#232	#234	#215
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		2022	1172	427	2620					310	311	304
Starvation Cap Reductn		0	0	0	199					0	0	0
Spillback Cap Reductn		9	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.86	0.53	0.75	0.93					0.72	0.72	0.73

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.6 Intersection LOS: B
Intersection Capacity Utilization 123.2% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Mitigated 2008 Project AM Alt A
25: 99 NB on-ramp & SR 145 / Madera Ave 7/21/2006

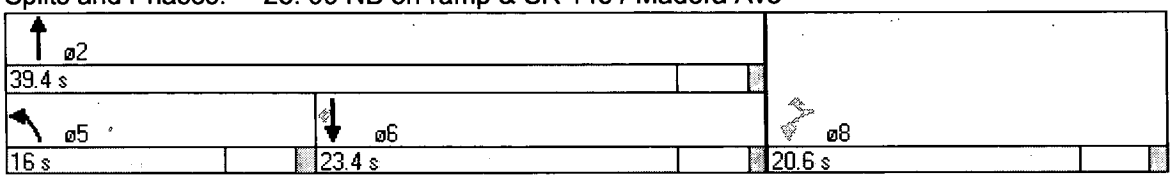
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46						485
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	377	0	42	392	503	0	0	165	446
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	410	0	46	426	547	0	0	179	485
Lane Group Flow (vph)	0	0	0	410	0	46	426	547	0	0	179	485
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	16.0	39.4	0.0	0.0	23.4	23.4
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	26.7%	65.7%	0.0%	0.0%	39.0%	39.0%
Maximum Green (s)				16.0		16.0	11.4	34.8			18.8	18.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				12.7		12.7	12.4	39.3			22.9	22.9
Actuated g/C Ratio				0.21		0.21	0.21	0.66			0.38	0.38
v/c Ratio				0.56		0.12	0.60	0.45			0.25	0.54
Control Delay				23.9		7.1	23.8	6.5			15.3	4.4
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				23.9		7.1	23.8	6.5			15.3	4.4
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								14.1			7.3	
Approach LOS								B			A	
Queue Length 50th (ft)				69		0	77	93			44	0
Queue Length 95th (ft)				97		20	104	169			91	56
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				950		471	737	1220			712	905
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.43		0.10	0.58	0.45			0.25	0.54

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 32 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 13.7 Intersection LOS: B
Intersection Capacity Utilization 45.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



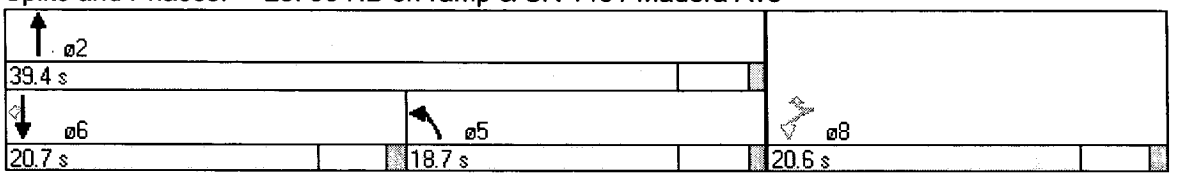
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41						480
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	250	0	38	612	686	0	0	265	442
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	272	0	41	665	746	0	0	288	480
Lane Group Flow (vph)	0	0	0	272	0	41	665	746	0	0	288	480
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	18.7	39.4	0.0	0.0	20.7	20.7
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	31.2%	65.7%	0.0%	0.0%	34.5%	34.5%
Maximum Green (s)				16.0		16.0	14.1	34.8			16.1	16.1
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				10.3		10.3	15.1	41.7			22.6	22.6
Actuated g/C Ratio				0.17		0.17	0.25	0.70			0.38	0.38
v/c Ratio				0.46		0.13	0.77	0.58			0.41	0.54
Control Delay				24.6		8.6	22.6	4.7			16.7	4.3
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				24.6		8.6	22.6	4.7			16.7	4.3
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								13.1			8.9	
Approach LOS								B			A	
Queue Length 50th (ft)				46		0	102	75			76	0
Queue Length 95th (ft)				73		21	m126	m96			140	54
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				950		468	881	1295			703	896
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.29		0.09	0.75	0.58			0.41	0.54

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 2 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 51.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						249
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	435	417	0	495	301
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	473	453	0	538	327
Lane Group Flow (vph)	0	473	453	0	538	327
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	28.0	28.0	0.0	32.0	32.0
Total Split (%)	0.0%	46.7%	46.7%	0.0%	53.3%	53.3%
Maximum Green (s)		23.4	23.4		27.4	27.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		28.8	28.8		23.2	23.2
Actuated g/C Ratio		0.48	0.48		0.39	0.39
v/c Ratio		0.53	0.51		0.79	0.43
Control Delay		15.2	7.5		24.9	4.9
Queue Delay		0.0	1.1		0.0	0.0
Total Delay		15.2	8.7		24.9	4.9
LOS		B	A		C	A
Approach Delay		15.2	8.7		17.3	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		B	
Queue Length 50th (ft)		117	39		159	17
Queue Length 95th (ft)		221	92		238	54
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		893	893		818	865
Starvation Cap Reductn		0	230		0	0
Spillback Cap Reductn		8	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.53	0.68		0.66	0.38

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 3 (5%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 14.6 Intersection LOS: B
Intersection Capacity Utilization 57.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp

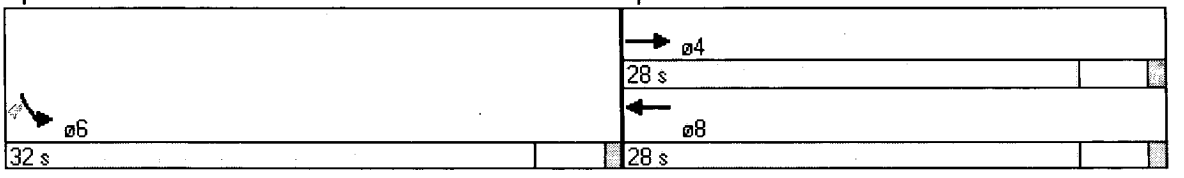
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						204
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	563	314	0	660	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	612	341	0	717	204
Lane Group Flow (vph)	0	612	341	0	717	204
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	28.0	28.0	0.0	32.0	32.0
Total Split (%)	0.0%	46.7%	46.7%	0.0%	53.3%	53.3%
Maximum Green (s)		23.4	23.4		27.4	27.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		25.3	25.3		26.7	26.7
Actuated g/C Ratio		0.42	0.42		0.44	0.44
v/c Ratio		0.78	0.43		0.91	0.25
Control Delay		25.0	6.7		33.4	2.6
Queue Delay		0.9	1.4		0.4	0.0
Total Delay		26.0	8.1		33.9	2.6
LOS		C	A		C	A
Approach Delay		26.0	8.1		26.9	
Approach LOS		C	A		C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		190	45		217	0
Queue Length 95th (ft)		#359	81		#420	28
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		784	784		826	848
Starvation Cap Reductn		0	263		0	0
Spillback Cap Reductn		43	0		11	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.83	0.65		0.88	0.24

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 8 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 23.2 Intersection LOS: C
Intersection Capacity Utilization 72.9% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.998	
Satd. Flow (prot)	3335	1810	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted	0.950						0.950				0.843	
Satd. Flow (perm)	3335	1810	1538	0	0	0	1752	1845	1568	0	2955	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			595						21			285
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	269	114	547	0	0	0	155	627	19	11	269	262
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	292	124	595	0	0	0	168	682	21	12	292	285
Lane Group Flow (vph)	292	124	595	0	0	0	168	682	21	0	304	285
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	23.0	23.0	23.0	0.0	0.0	0.0	15.0	37.0	37.0	22.0	22.0	22.0
Total Split (%)	38.3%	38.3%	38.3%	0.0%	0.0%	0.0%	25.0%	61.7%	61.7%	36.7%	36.7%	36.7%
Maximum Green (s)	18.4	18.4	18.4				10.4	32.4	32.4	17.4	17.4	17.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	11.3	11.3	11.3				10.0	40.7	40.7		28.8	28.8
Actuated g/C Ratio	0.19	0.19	0.19				0.17	0.68	0.68		0.48	0.48
v/c Ratio	0.46	0.36	0.77				0.58	0.54	0.02		0.21	0.32
Control Delay	25.5	24.6	9.9				31.1	8.1	2.7		4.3	2.6
Queue Delay	0.2	0.4	0.7				0.0	0.0	0.0		0.0	0.1
Total Delay	25.7	24.9	10.5				31.1	8.1	2.7		4.3	2.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	B				C	A	A		A	A
Approach Delay		16.7						12.4			3.5	
Approach LOS		B						B			A	
Queue Length 50th (ft)	52	43	27				55	87	0		15	0
Queue Length 95th (ft)	m60	m55	m61				108	264	8		37	15
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1056	573	894				325	1252	1070		1420	902
Starvation Cap Reductn	290	174	88				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	104
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.38	0.31	0.74				0.52	0.54	0.02		0.21	0.36

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 54 (90%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 12.0 Intersection LOS: B
Intersection Capacity Utilization 58.4% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave

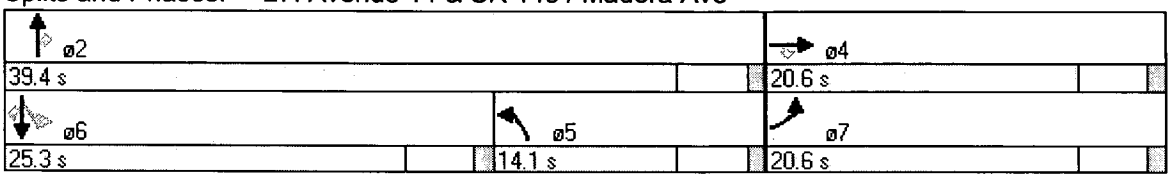
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.997	
Satd. Flow (prot)	3367	1827	1553	0	0	0	1770	1863	1583	0	3529	1583
Flt Permitted	0.950						0.950				0.682	
Satd. Flow (perm)	3367	1827	1553	0	0	0	1770	1863	1583	0	2414	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			574						17			208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	318	187	718	0	0	0	123	980	16	19	296	191
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	346	203	780	0	0	0	134	1065	17	21	322	208
Lane Group Flow (vph)	346	203	780	0	0	0	134	1065	17	0	343	208
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	20.6	20.6	20.6	0.0	0.0	0.0	14.1	39.4	39.4	25.3	25.3	25.3
Total Split (%)	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%	23.5%	65.7%	65.7%	42.2%	42.2%	42.2%
Maximum Green (s)	16.0	16.0	16.0				9.5	34.8	34.8	20.7	20.7	20.7
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	15.3	15.3	15.3				11.2	36.7	36.7		23.6	23.6
Actuated g/C Ratio	0.26	0.26	0.26				0.19	0.61	0.61		0.39	0.39
v/c Ratio	0.40	0.44	0.95				0.41	0.93	0.02		0.36	0.28
Control Delay	19.6	20.5	22.0				25.9	29.0	2.8		7.8	3.3
Queue Delay	3.9	12.9	36.7				0.0	0.0	0.0		0.0	0.1
Total Delay	23.5	33.4	58.7				25.9	29.0	2.8		7.8	3.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	E				C	C	A		A	A
Approach Delay		45.7						28.3			6.1	
Approach LOS		D						C			A	
Queue Length 50th (ft)	53	61	75				43	322	0		39	0
Queue Length 95th (ft)	m65	m76	m#215				90	#610	6		63	24
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	932	505	845				352	1141	976		1024	791
Starvation Cap Reductn	490	274	121				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	86
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.78	0.88	1.08				0.38	0.93	0.02		0.33	0.30

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 31.8 Intersection LOS: C
Intersection Capacity Utilization 80.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



ATTACHMENT VI – C - 19

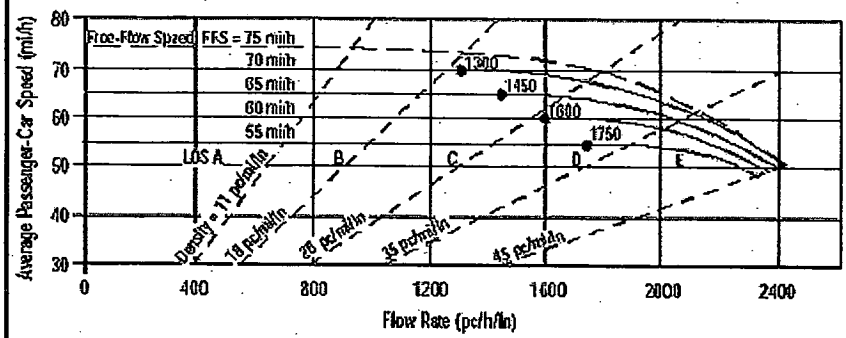
MITIGATED OPENING DAY (2008)

PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2742*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

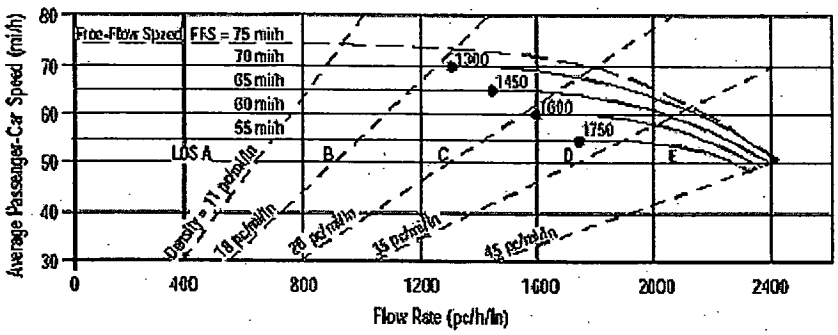
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1117*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*16.0*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt b

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2910*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

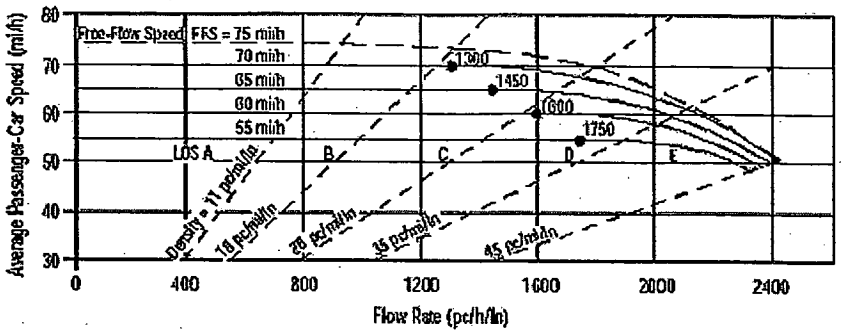
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1185*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*16.9*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2311*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*2*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1412*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*20.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

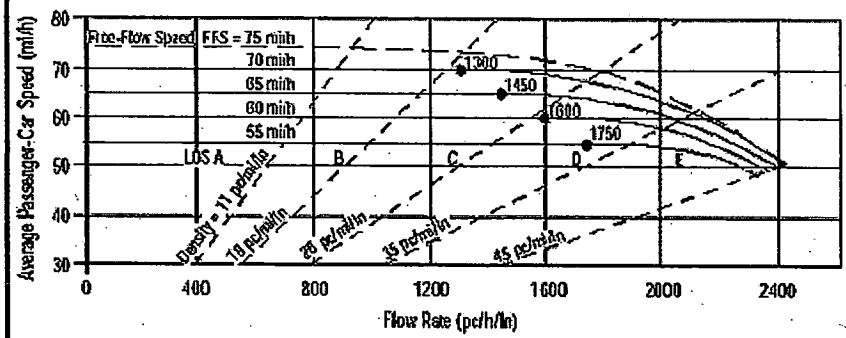
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2485*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

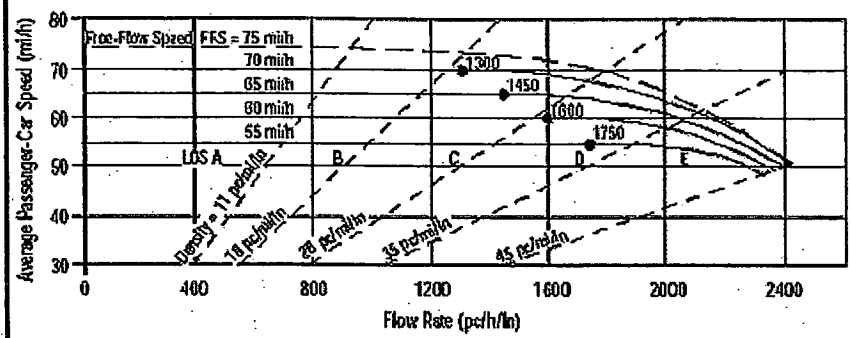
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*2*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1518*	pc/h/ln	Design LOS		
S	*69.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*21.8*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2975*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

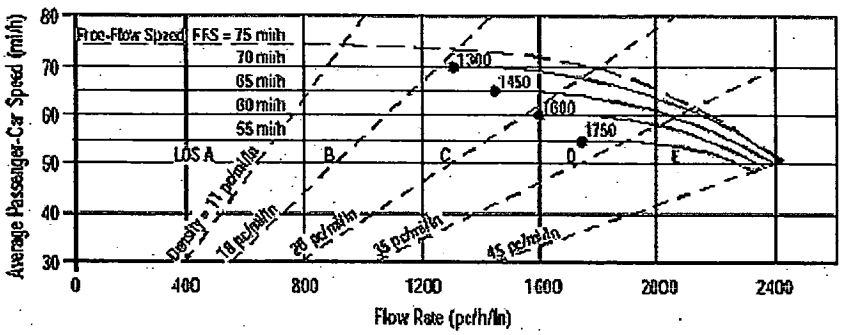
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1212*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*17.3*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☒ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3083*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

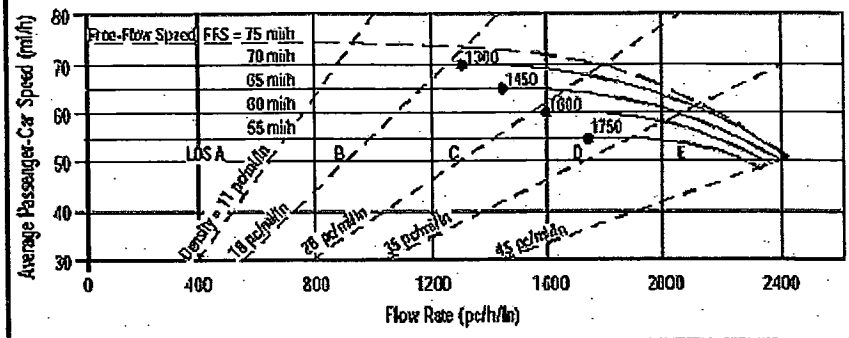
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1256*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*17.9*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

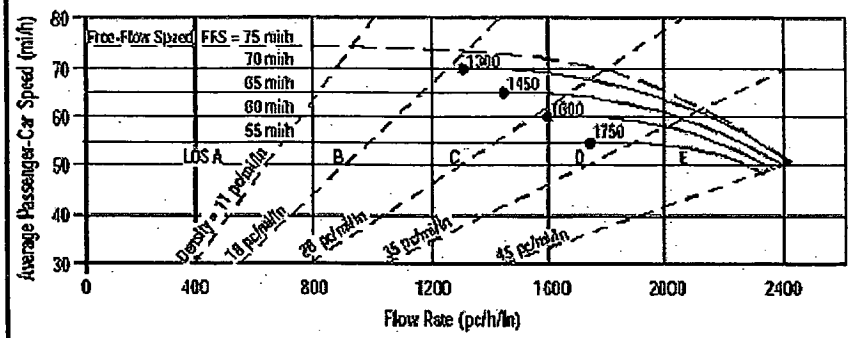
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1003*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*14.3*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3715*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

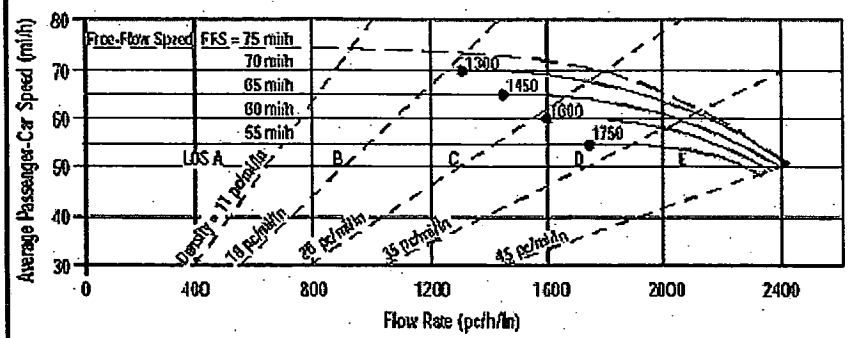
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1513*	pc/h/ln	Design LOS	
S	*69.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*21.7*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3477*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1416*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*20.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

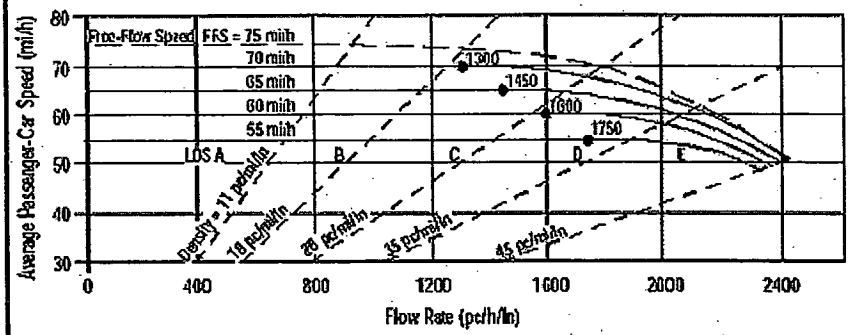
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description: 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4191*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1707*	pc/h/ln
S	*68.7*	mi/h
D = v_p / S	*24.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

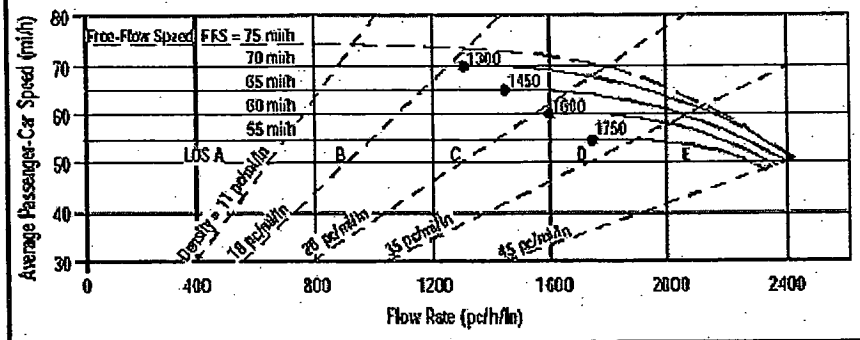
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2692*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*822*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*11.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

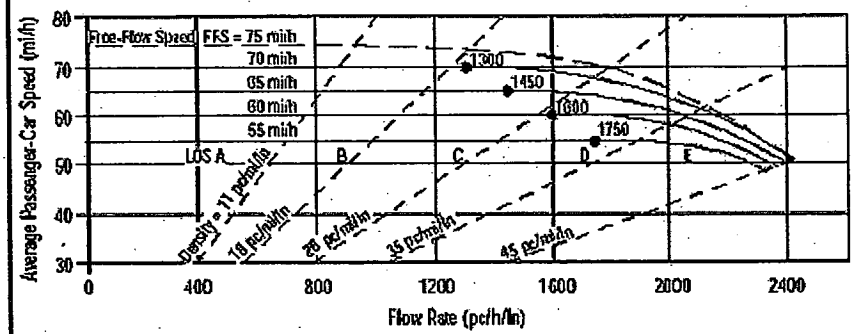
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4766*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1456*	pc/h/ln
S	*69.9*	mi/h
D = v_p / S	*20.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 20

MITIGATED OPENING DAY (2008)

PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		25	0		0
Storage Lanes	0		0	1		0	1		1	0		0
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
Leading Detector (ft)		50		50	50		50		50	50	50	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978							0.850		0.956	
Flt Protected				0.950			0.950				0.997	
Satd. Flow (prot)	0	1440	0	1480	1557	0	1504	0	1346	0	1322	0
Flt Permitted				0.950			0.532				0.997	
Satd. Flow (perm)	0	1440	0	1480	1557	0	842	0	1346	0	1322	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20							142		40	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		285			942			3168			3472	
Travel Time (s)		5.6			18.4			72.0			78.9	
Volume (vph)	0	355	68	34	256	0	64	0	125	12	126	66
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	29%	22%	22%	22%	20%	20%	20%	37%	37%	37%
Adj. Flow (vph)	0	403	77	39	291	0	73	0	142	14	143	75
Lane Group Flow (vph)	0	480	0	39	291	0	73	0	142	0	232	0
Turn Type				Prot			custom		custom	Perm		
Protected Phases		4		3	8						6	
Permitted Phases							2		2	6		
Detector Phases		4		3	8		2		2	6	6	
Minimum Initial (s)		4.0		4.0	4.0		4.0		4.0	4.0	4.0	
Minimum Split (s)		20.9		8.6	20.9		20.9		20.9	20.9	20.9	
Total Split (s)	0.0	30.4	0.0	8.6	39.0	0.0	21.0	0.0	21.0	21.0	21.0	0.0
Total Split (%)	0.0%	50.7%	0.0%	14.3%	65.0%	0.0%	35.0%	0.0%	35.0%	35.0%	35.0%	0.0%
Maximum Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
Yellow Time (s)		3.6		3.6	3.6		3.6		3.6	3.6	3.6	
All-Red Time (s)		1.0		1.0	1.0		1.0		1.0	1.0	1.0	
Lead/Lag		Lead		Lag								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode		C-Max		None	C-Max		Max		Max	Max	Max	
Act Effct Green (s)		29.8		4.6	35.0		17.0		17.0		17.0	
Actuated g/C Ratio		0.50		0.08	0.58		0.28		0.28		0.28	
v/c Ratio		0.66		0.35	0.32		0.31		0.29		0.58	
Control Delay		18.3		21.7	1.9		21.2		5.5		21.8	
Queue Delay		1.2		0.0	0.0		0.0		0.0		0.0	
Total Delay		19.5		21.7	1.9		21.2		5.5		21.8	
LOS		B		C	A		C		A		C	
Approach Delay		19.5			4.2						21.8	
Approach LOS		B			A						C	

J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
90th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
70th %ile Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
70th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
50th %ile Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
50th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
30th %ile Green (s)		34.4		0.0	34.4		16.4		16.4	16.4	16.4	
30th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
10th %ile Green (s)		34.4		0.0	34.4		16.4		16.4	16.4	16.4	
10th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
Queue Length 50th (ft)		131		13	7		21		0		58	
Queue Length 95th (ft)		#249		m21	m10		51		33		118	
Internal Link Dist (ft)		205			862			3088			3392	
Turn Bay Length (ft)									25			
Base Capacity (vph)		726		113	908		239		483		403	
Starvation Cap Reductn		95		0	0		0		0		0	
Spillback Cap Reductn		0		0	0		0		0		0	
Storage Cap Reductn		0		0	0		0		0		0	
Reduced v/c Ratio		0.76		0.35	0.32		0.31		0.29		0.58	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 50 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 14.4 Intersection LOS: B
Intersection Capacity Utilization 53.1% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp

ø2	ø4	ø3
21 s	30.4 s	8.6 s
ø6	ø8	
21 s	39 s	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		25	0		0
Storage Lanes	0		0	1		0	1		1	0		0
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
Leading Detector (ft)		50		50	50		50		50	50	50	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978							0.850		0.950	
Flt Protected				0.950			0.950				0.995	
Satd. Flow (prot)	0	1440	0	1480	1557	0	1504	0	1346	0	1311	0
Flt Permitted				0.950			0.388				0.995	
Satd. Flow (perm)	0	1440	0	1480	1557	0	614	0	1346	0	1311	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18							236		46	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		285			942			3168			3472	
Travel Time (s)		5.6			18.4			72.0			78.9	
Volume (vph)	0	372	73	48	288	0	61	0	208	36	177	127
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	29%	22%	22%	22%	20%	20%	20%	37%	37%	37%
Adj. Flow (vph)	0	423	83	55	327	0	69	0	236	41	201	144
Lane Group Flow (vph)	0	506	0	55	327	0	69	0	236	0	386	0
Turn Type				Prot			custom		custom	Perm		
Protected Phases		4		3	8						6	
Permitted Phases							2		2	6		
Detector Phases		4		3	8		2		2	6	6	
Minimum Initial (s)		4.0		4.0	4.0		4.0		4.0	4.0	4.0	
Minimum Split (s)		20.9		8.6	20.9		20.9		20.9	20.9	20.9	
Total Split (s)	0.0	34.0	0.0	9.0	43.0	0.0	27.0	0.0	27.0	27.0	27.0	0.0
Total Split (%)	0.0%	48.6%	0.0%	12.9%	61.4%	0.0%	38.6%	0.0%	38.6%	38.6%	38.6%	0.0%
Maximum Green (s)		29.4		4.4	38.4		22.4		22.4	22.4	22.4	
Yellow Time (s)		3.6		3.6	3.6		3.6		3.6	3.6	3.6	
All-Red Time (s)		1.0		1.0	1.0		1.0		1.0	1.0	1.0	
Lead/Lag		Lead		Lag								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode		C-Max		None	C-Max		Max		Max	Max	Max	
Act Effct Green (s)		33.6		5.0	39.0		23.0		23.0		23.0	
Actuated g/C Ratio		0.48		0.07	0.56		0.33		0.33		0.33	
v/c Ratio		0.72		0.52	0.38		0.34		0.39		0.84	
Control Delay		23.4		36.6	1.4		23.7		4.9		37.6	
Queue Delay		4.0		0.0	0.0		0.0		0.0		0.0	
Total Delay		27.4		36.6	1.4		23.7		4.9		37.6	
LOS		C		D	A		C		A		D	
Approach Delay		27.4			6.5						37.6	
Approach LOS		C			A						D	

J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)		29.4		4.4	38.4		22.4		22.4	22.4	22.4	
90th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
70th %ile Green (s)		29.4		4.4	38.4		22.4		22.4	22.4	22.4	
70th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
50th %ile Green (s)		29.4		4.4	38.4		22.4		22.4	22.4	22.4	
50th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
30th %ile Green (s)		38.4		0.0	38.4		22.4		22.4	22.4	22.4	
30th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
10th %ile Green (s)		38.4		0.0	38.4		22.4		22.4	22.4	22.4	
10th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
Queue Length 50th (ft)		177		26	3		22		0		134	
Queue Length 95th (ft)		#331		m37	m3		55		41		#275	
Internal Link Dist (ft)		205			862			3088			3392	
Turn Bay Length (ft)									25			
Base Capacity (vph)		700		106	867		202		601		462	
Starvation Cap Reductn		123		0	0		0		0		0	
Spillback Cap Reductn		0		0	0		0		0		0	
Storage Cap Reductn		0		0	0		0		0		0	
Reduced v/c Ratio		0.88		0.52	0.38		0.34		0.39		0.84	

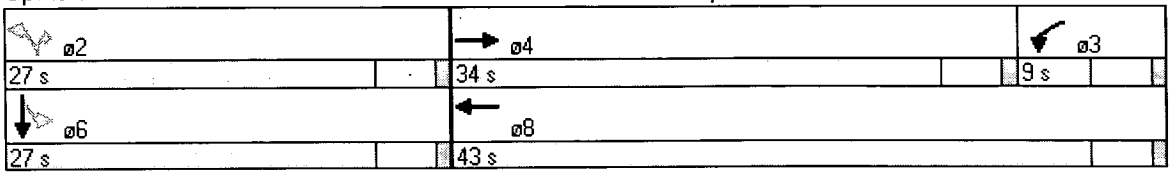
Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 64 (91%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 21.3 Intersection LOS: C
Intersection Capacity Utilization 65.9% ICU Level of Service C
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.973				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1220	1284	0	0	1696	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1220	1284	0	0	1696	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					21				15			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	193	56	0	0	96	24	242	0	22	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	219	64	0	0	109	27	275	0	25	0	0	0
Lane Group Flow (vph)	219	64	0	0	136	0	0	275	25	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	18.0	39.1	0.0	0.0	21.1	0.0	20.9	20.9	20.9	0.0	0.0	0.0
Total Split (%)	30.0%	65.2%	0.0%	0.0%	35.2%	0.0%	34.8%	34.8%	34.8%	0.0%	0.0%	0.0%
Maximum Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	14.0	36.5			18.5			15.5	15.5			
Actuated g/C Ratio	0.23	0.61			0.31			0.26	0.26			
v/c Ratio	0.77	0.08			0.25			0.80	0.08			
Control Delay	32.3	2.2			15.5			39.7	11.2			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	32.3	2.2			15.5			39.7	11.2			

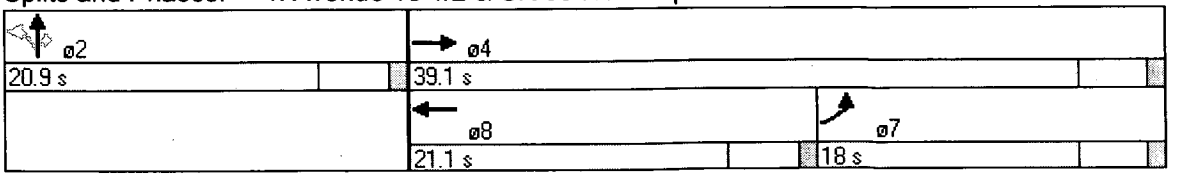
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B			D	B			
Approach Delay		25.5			15.5			37.3				
Approach LOS		C			B			D				
90th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	13.4	36.0			18.0		14.8	14.8	14.8			
30th %ile Term Code	Max	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	13.4	40.2			22.2		10.6	10.6	10.6			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	73	3			32			89	3			
Queue Length 95th (ft)	m#149	m7			68			#187	17			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	285	782			538			377	348			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.77	0.08			0.25			0.73	0.07			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 28.5 Intersection LOS: C
Intersection Capacity Utilization 37.4% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.990				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1480	1557	0	0	1636	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1480	1557	0	0	1636	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5				23			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	262	93	0	0	127	10	285	0	46	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	298	106	0	0	144	11	324	0	52	0	0	0
Lane Group Flow (vph)	298	106	0	0	155	0	0	324	52	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	24.0	46.0	0.0	0.0	22.0	0.0	24.0	24.0	24.0	0.0	0.0	0.0
Total Split (%)	34.3%	65.7%	0.0%	0.0%	31.4%	0.0%	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	20.0	43.7			19.7			18.3	18.3			
Actuated g/C Ratio	0.29	0.62			0.28			0.26	0.26			
v/c Ratio	0.70	0.11			0.33			0.83	0.14			
Control Delay	23.5	3.2			22.7			43.1	13.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	23.5	3.2			22.7			43.1	13.3			

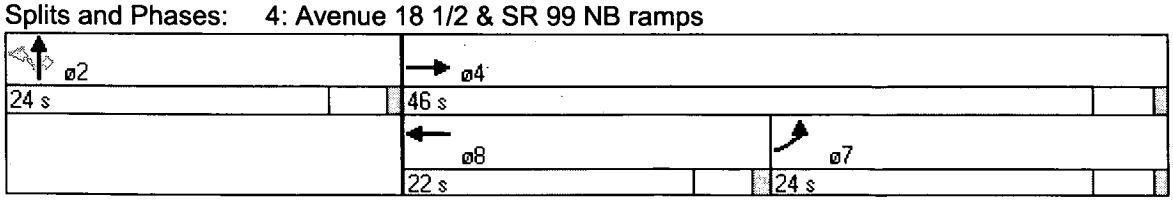
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		18.1			22.7			39.0				
Approach LOS		B			C			D				
90th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
50th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	19.4	43.6			19.6		17.2	17.2	17.2			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	19.4	47.9			23.9		12.9	12.9	12.9			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	92	8			53			126	9			
Queue Length 95th (ft)	m151	m17			99			#236	32			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	423	973			465			430	401			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.70	0.11			0.33			0.75	0.13			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.3 Intersection LOS: C
Intersection Capacity Utilization 47.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



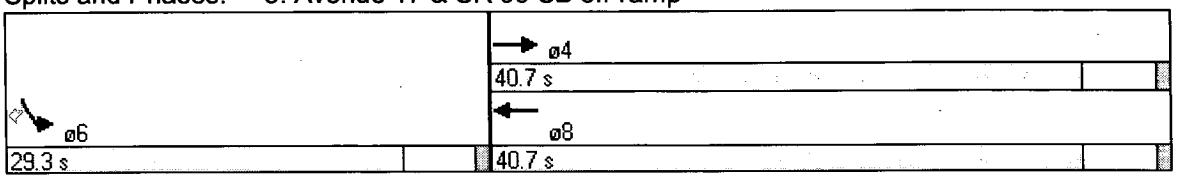
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3374	3505	0	1703	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	3374	3505	0	1703	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						66
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	680	970	0	135	62
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	773	1102	0	153	70
Lane Group Flow (vph)	0	773	1102	0	153	70
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	40.7	40.7	0.0	29.3	29.3
Total Split (%)	0.0%	58.1%	58.1%	0.0%	41.9%	41.9%
Maximum Green (s)		35.4	35.4		24.0	24.0
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		49.7	49.7		12.3	12.3
Actuated g/C Ratio		0.71	0.71		0.18	0.18
v/c Ratio		0.32	0.44		0.51	0.22
Control Delay		1.7	2.4		31.6	8.9
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		1.7	2.4		31.6	8.9
LOS		A	A		C	A
Approach Delay		1.7	2.4		24.5	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)		15	2		61	1
Queue Length 95th (ft)		31	54		102	29
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2395	2489		616	593
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.32	0.44		0.25	0.12

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 67 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 4.4 Intersection LOS: A
Intersection Capacity Utilization 53.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



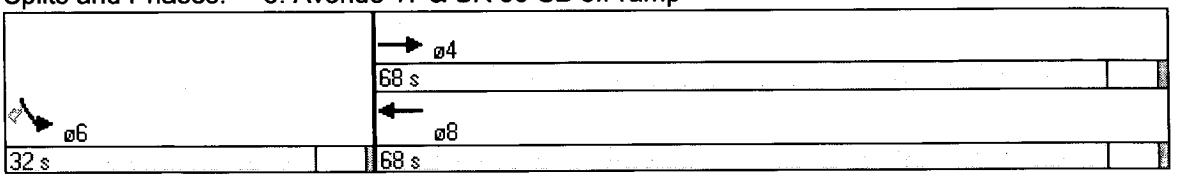
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3343	0	1671	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3343	0	1671	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						30
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1640	1501	0	282	74
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	1864	1706	0	320	84
Lane Group Flow (vph)	0	1864	1706	0	320	84
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	68.0	68.0	0.0	32.0	32.0
Total Split (%)	0.0%	68.0%	68.0%	0.0%	32.0%	32.0%
Maximum Green (s)		62.7	62.7		26.7	26.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		68.2	68.2		23.8	23.8
Actuated g/C Ratio		0.68	0.68		0.24	0.24
v/c Ratio		0.79	0.75		0.80	0.22
Control Delay		3.2	7.5		51.3	20.8
Queue Delay		0.2	0.0		0.0	0.0
Total Delay		3.4	7.5		51.3	20.8
LOS		A	A		D	C
Approach Delay		3.4	7.5		45.0	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		D	
Queue Length 50th (ft)		65	240		191	27
Queue Length 95th (ft)		90	294		271	61
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2367	2280		468	440
Starvation Cap Reductn		98	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.82	0.75		0.68	0.19

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 9.4 Intersection LOS: A
Intersection Capacity Utilization 73.5% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



Mitigated 2008 Project Alt B AM
6: Avenue 17 & SR 99 NB ramps 7/22/2006

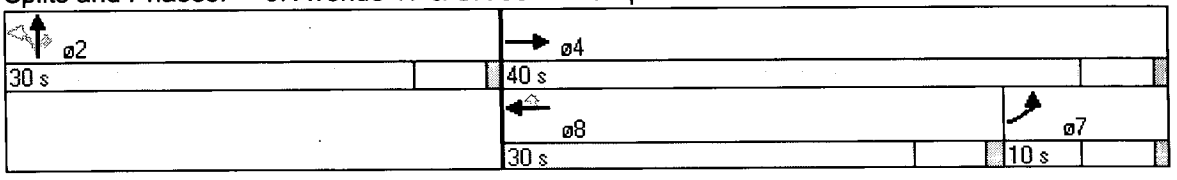
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.957				
Satd. Flow (prot)	1752	3505	0	0	3539	1583	1681	1694	2787	0	0	0
Flt Permitted	0.950						0.950	0.957				
Satd. Flow (perm)	1752	3505	0	0	3539	1583	1681	1694	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73			308			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	42	288	0	0	791	64	629	36	271	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	48	327	0	0	899	73	715	41	308	0	0	0
Lane Group Flow (vph)	48	327	0	0	899	73	368	388	308	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	10.0	40.0	0.0	0.0	30.0	30.0	30.0	30.0	30.0	0.0	0.0	0.0
Total Split (%)	14.3%	57.1%	0.0%	0.0%	42.9%	42.9%	42.9%	42.9%	42.9%	0.0%	0.0%	0.0%
Maximum Green (s)	4.7	34.7			24.7	24.7	24.7	24.7	24.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	6.0	39.9			33.9	33.9	22.1	22.1	22.1			
Actuated g/C Ratio	0.09	0.57			0.48	0.48	0.32	0.32	0.32			
v/c Ratio	0.32	0.16			0.53	0.09	0.69	0.72	0.28			
Control Delay	23.5	3.5			16.2	4.5	27.7	29.0	2.8			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	23.5	3.5			16.2	4.5	27.7	29.0	2.8			
LOS	C	A			B	A	C	C	A			
Approach Delay		6.0			15.3			21.0				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			B			C				
Queue Length 50th (ft)	14	13			158	0	137	147	0			
Queue Length 95th (ft)	m37	23			222	22	210	224	22			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	150	1996			1712	803	624	629	1229			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.32	0.16			0.53	0.09	0.59	0.62	0.25			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 63 (90%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 16.4 Intersection LOS: B
Intersection Capacity Utilization 53.6% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



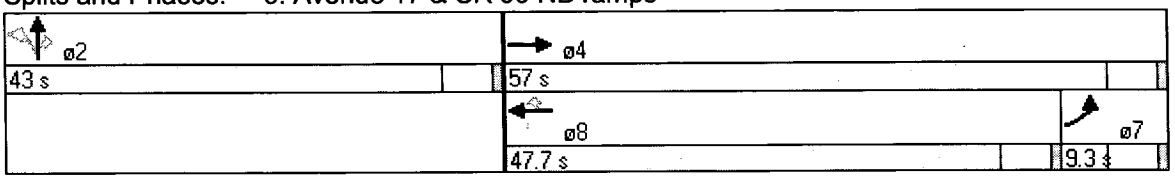
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.950				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1681	2787	0	0	0
Flt Permitted	0.950						0.950	0.950				
Satd. Flow (perm)	1770	3539	0	0	3539	1583	1681	1681	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						199			178			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	57	837	0	0	1298	194	875	0	1011	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	65	951	0	0	1475	220	994	0	1149	0	0	0
Lane Group Flow (vph)	65	951	0	0	1475	220	497	497	1149	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	9.3	57.0	0.0	0.0	47.7	47.7	43.0	43.0	43.0	0.0	0.0	0.0
Total Split (%)	9.3%	57.0%	0.0%	0.0%	47.7%	47.7%	43.0%	43.0%	43.0%	0.0%	0.0%	0.0%
Maximum Green (s)	4.0	51.7			42.4	42.4	37.7	37.7	37.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	5.3	53.0			45.6	45.6	39.0	39.0	39.0			
Actuated g/C Ratio	0.05	0.53			0.46	0.46	0.39	0.39	0.39			
v/c Ratio	0.69	0.51			0.91	0.27	0.76	0.76	0.96			
Control Delay	65.8	13.4			36.4	4.3	35.3	35.3	44.2			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	65.8	13.4			36.4	4.3	35.3	35.3	44.2			
LOS	E	B			D	A	D	D	D			
Approach Delay		16.7			32.2			40.1				
Approach LOS		B			C			D				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	40	125			465	7	284	284	351			
Queue Length 95th (ft)	m52	158			#603	47	406	406	#496			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	94	1876			1613	830	656	656	1196			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.69	0.51			0.91	0.27	0.76	0.76	0.96			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 8 (8%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 32.4 Intersection LOS: C
Intersection Capacity Utilization 73.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



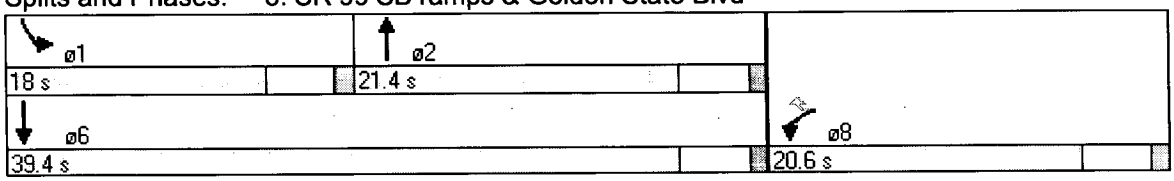
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.921			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1626	1455	1716	0	1770	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1626	1455	1716	0	1770	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		243	119			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	61	214	89	125	209	25
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	69	243	101	142	238	28
Lane Group Flow (vph)	69	243	243	0	238	28
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	20.6	20.6	21.4	0.0	18.0	39.4
Total Split (%)	34.3%	34.3%	35.7%	0.0%	30.0%	65.7%
Maximum Green (s)	16.0	16.0	16.8		13.4	34.8
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	8.8	8.8	25.4		13.9	43.2
Actuated g/C Ratio	0.15	0.15	0.42		0.23	0.72
v/c Ratio	0.29	0.58	0.31		0.58	0.02
Control Delay	25.0	9.6	1.9		25.6	3.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	25.0	9.6	1.9		25.6	3.1
LOS	C	A	A		C	A
Approach Delay	13.0		1.9			23.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		A			C
Queue Length 50th (ft)	23	0	2		77	2
Queue Length 95th (ft)	49	46	m16		118	9
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	450	578	803		457	1342
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.15	0.42	0.30		0.52	0.02

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 2 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 37.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



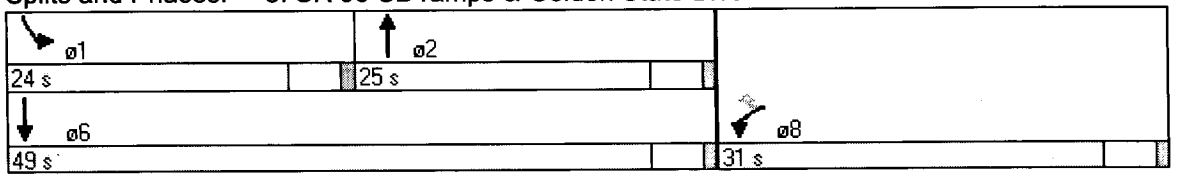
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.930			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1538	1732	0	1641	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1538	1732	0	1641	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		710	65			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	166	625	143	152	246	35
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	189	710	162	173	280	40
Lane Group Flow (vph)	189	710	335	0	280	40
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	31.0	31.0	25.0	0.0	24.0	49.0
Total Split (%)	38.8%	38.8%	31.3%	0.0%	30.0%	61.3%
Maximum Green (s)	26.4	26.4	20.4		19.4	44.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.6	16.6	33.3		18.1	55.4
Actuated g/C Ratio	0.21	0.21	0.42		0.23	0.69
v/c Ratio	0.53	0.80	0.44		0.76	0.03
Control Delay	32.2	10.0	2.1		42.3	5.8
Queue Delay	0.0	0.0	0.3		0.0	0.0
Total Delay	32.2	10.0	2.3		42.3	5.8
LOS	C	B	A		D	A
Approach Delay	14.7		2.3			37.7

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		A			D
Queue Length 50th (ft)	86	0	1		129	5
Queue Length 95th (ft)	119	64	m30		204	21
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	580	989	760		421	1196
Starvation Cap Reductn	0	0	94		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.33	0.72	0.50		0.67	0.03

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 5 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 16.8 Intersection LOS: B
Intersection Capacity Utilization 62.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



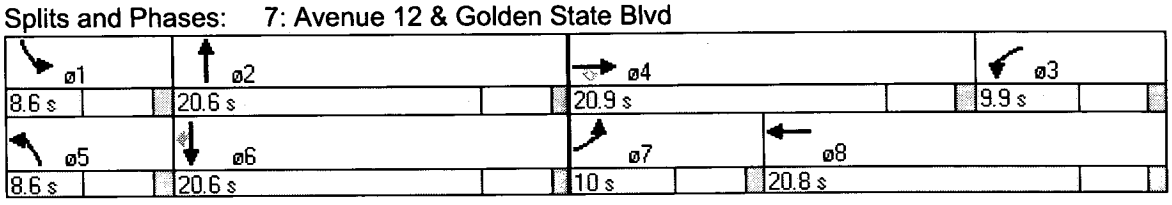
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.986			0.852				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		8			313				24
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	180	249	24	83	292	29	70	5	288	59	5	22
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	196	271	26	90	317	32	76	5	313	64	5	24
Lane Group Flow (vph)	196	271	26	90	349	0	76	318	0	64	5	24
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	10.0	20.9	20.9	9.9	20.8	0.0	8.6	20.6	0.0	8.6	20.6	20.6
Total Split (%)	16.7%	34.8%	34.8%	16.5%	34.7%	0.0%	14.3%	34.3%	0.0%	14.3%	34.3%	34.3%
Maximum Green (s)	5.4	16.3	16.3	5.3	16.2		4.0	16.0		4.0	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	14.2	28.5	28.5	5.9	18.2		4.6	8.7		4.6	8.7	8.7
Actuated g/C Ratio	0.24	0.48	0.48	0.10	0.30		0.08	0.14		0.08	0.14	0.14
v/c Ratio	0.50	0.33	0.04	0.54	0.65		0.61	0.67		0.48	0.02	0.10
Control Delay	30.6	14.4	6.5	30.1	17.4		51.1	10.6		28.5	10.4	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	30.6	14.4	6.5	30.1	17.4		51.1	10.6		28.5	10.4	6.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B	A	C	B		D	B		C	B	A
Approach Delay		20.4			20.0			18.4			21.8	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	59	61	0	34	68		27	2		8	2	0
Queue Length 95th (ft)	#181	142	14	m#59	#117		#83	55		#34	m5	16
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	389	820	711	167	541		124	626		132	501	443
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.33	0.04	0.54	0.65		0.61	0.51		0.48	0.01	0.05

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 8 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 19.8 Intersection LOS: B
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996			0.855				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1785	0	1687	1518	0	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1785	0	1687	1518	0	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		2			313				36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	276	418	14	101	343	10	149	9	288	170	9	33
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	300	454	15	110	373	11	162	10	313	185	10	36
Lane Group Flow (vph)	300	454	15	110	384	0	162	323	0	185	10	36
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	20.0	33.4	33.4	12.0	25.4	0.0	13.0	20.6	0.0	14.0	21.6	21.6
Total Split (%)	25.0%	41.8%	41.8%	15.0%	31.8%	0.0%	16.3%	25.8%	0.0%	17.5%	27.0%	27.0%
Maximum Green (s)	15.4	28.8	28.8	7.4	20.8		8.4	16.0		9.4	17.0	17.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	19.3	37.1	37.1	10.0	25.5		9.0	9.2		10.0	10.2	10.2
Actuated g/C Ratio	0.24	0.46	0.46	0.12	0.32		0.11	0.12		0.12	0.13	0.13
v/c Ratio	0.74	0.55	0.02	0.52	0.67		0.85	0.72		0.88	0.04	0.16
Control Delay	41.4	21.1	8.2	50.9	25.3		73.5	14.0		56.6	15.7	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	41.4	21.1	8.2	50.9	25.3		73.5	14.0		56.6	15.7	11.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	C		E	B		E	B	B
Approach Delay		28.8			31.0			33.9			47.8	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	129	162	0	60	111		81	5		98	5	4
Queue Length 95th (ft)	#289	295	12	m#115	#298		#187	71		#211	m10	m25
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	410	823	708	216	571		190	563		211	391	360
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.55	0.02	0.51	0.67		0.85	0.57		0.88	0.03	0.10

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 18 (23%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 32.8 Intersection LOS: C
Intersection Capacity Utilization 75.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

ø1	ø2	ø3	ø4
14 s	20.6 s	12 s	33.4 s
ø5	ø6	ø7	ø8
13 s	21.6 s	20 s	25.4 s

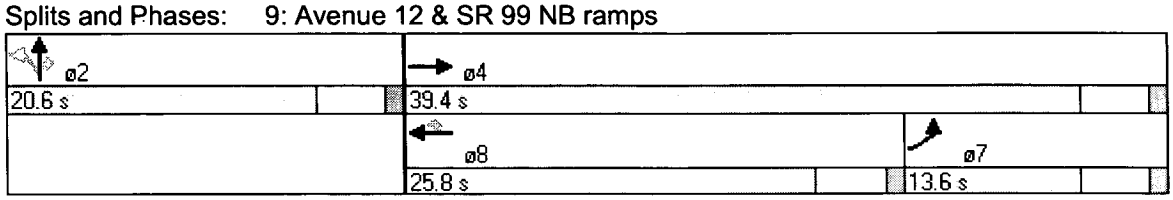
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						418			89			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	104	492	0	0	249	368	155	4	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	118	559	0	0	283	418	176	5	89	0	0	0
Lane Group Flow (vph)	118	559	0	0	283	418	0	181	89	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	13.6	39.4	0.0	0.0	25.8	25.8	20.6	20.6	20.6	0.0	0.0	0.0
Total Split (%)	22.7%	65.7%	0.0%	0.0%	43.0%	43.0%	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	9.0	34.8			21.2	21.2	16.0	16.0	16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	39.9			29.0	29.0		12.1	12.1			
Actuated g/C Ratio	0.15	0.66			0.48	0.48		0.20	0.20			
v/c Ratio	0.45	0.46			0.32	0.43		0.55	0.25			
Control Delay	24.1	4.4			13.2	3.3		27.3	6.7			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	24.1	4.4			13.2	3.3		27.3	6.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		C	A			
Approach Delay		7.8			7.3			20.5				
Approach LOS		A			A			C				
Queue Length 50th (ft)	40	58			65	0		59	0			
Queue Length 95th (ft)	m64	95			129	46		100	26			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	280	1226			883	966		448	463			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.42	0.46			0.32	0.43		0.40	0.19			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 9.7 Intersection LOS: A
Intersection Capacity Utilization 47.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



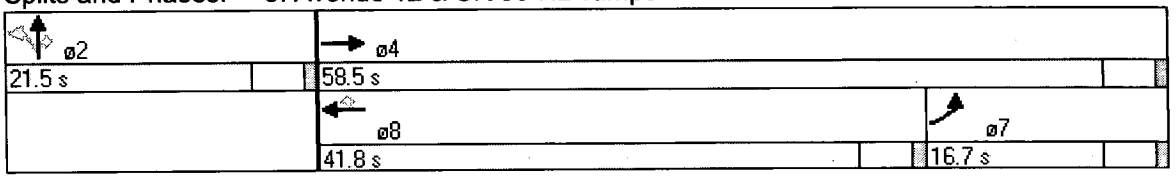
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						534			149			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	114	762	0	0	280	470	174	1	131	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	130	866	0	0	318	534	198	1	149	0	0	0
Lane Group Flow (vph)	130	866	0	0	318	534	0	199	149	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	16.7	58.5	0.0	0.0	41.8	41.8	21.5	21.5	21.5	0.0	0.0	0.0
Total Split (%)	20.9%	73.1%	0.0%	0.0%	52.3%	52.3%	26.9%	26.9%	26.9%	0.0%	0.0%	0.0%
Maximum Green (s)	12.1	53.9			37.2	37.2	16.9	16.9	16.9			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	11.6	57.5			44.2	44.2		14.5	14.5			
Actuated g/C Ratio	0.14	0.72			0.55	0.55		0.18	0.18			
v/c Ratio	0.52	0.67			0.32	0.49		0.66	0.38			
Control Delay	30.2	4.7			12.9	3.0		41.1	8.0			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	30.2	4.7			12.9	3.0		41.1	8.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		D	A			
Approach Delay		8.1			6.7			26.9				
Approach LOS		A			A			C				
Queue Length 50th (ft)	55	48			90	0		93	0			
Queue Length 95th (ft)	m86	m114			152	45		151	43			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	273	1302			1000	1088		363	441			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.48	0.67			0.32	0.49		0.55	0.34			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 16 (20%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 10.5 Intersection LOS: B
Intersection Capacity Utilization 56.5% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	Mitigated 2008 Project AM		

Project Description 04-837.1 Alt B

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	169	1	67	160	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	8	8	1	14	36
Percent Heavy Vehicles	11	–	–	19	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	8	8	1	13	34
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	72	173	2	16	183	1
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	16	72		51			19	
C (m) (veh/h)	1349	1295		660			532	
v/c	0.01	0.06		0.08			0.04	
95% queue length	0.04	0.18		0.25			0.11	
Control Delay (s/veh)	7.7	7.9		10.9			12.0	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	10.9			12.0		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	Mitigated 2008 Project PM		

Project Description 04-837.1 Alt B

East/West Street: Avenue 18 | North/South Street: Road 23

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	236	4	89	253	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	11	5	1	10	93
Percent Heavy Vehicles	13	–	–	15	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	11	5	1	10	86
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	96	274	1	15	256	4
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	15	96		104			17	
C (m) (veh/h)	1227	1233		675			367	
v/c	0.01	0.08		0.15			0.05	
95% queue length	0.04	0.25		0.54			0.15	
Control Delay (s/veh)	8.0	8.2		11.3			15.3	
LOS	A	A		B			C	
Approach Delay (s/veh)	–	–	11.3			15.3		
Approach LOS	–	–	B			C		

Copyright © 2005 University of Florida, All Rights Reserved HCS+™ Version 5.2 Generated: 7/22/2006 9:45 PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.974			0.950			0.942			0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1814	0	1770	1770	0	1770	1755	0	1770	1861	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1814	0	1770	1770	0	1770	1755	0	1770	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			10			48			1	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	2	44	9	109	18	9	5	170	107	22	118	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	48	10	118	20	10	5	185	116	24	128	1
Lane Group Flow (vph)	2	58	0	118	30	0	5	301	0	24	129	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	12.0	24.0	0.0	9.3	22.4	0.0	9.3	22.4	0.0
Total Split (%)	14.3%	32.8%	0.0%	18.5%	36.9%	0.0%	14.3%	34.5%	0.0%	14.3%	34.5%	0.0%
Maximum Green (s)	4.0	16.0		6.7	18.7		4.0	17.1		4.0	17.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.1	9.6		9.7	14.3		6.1	36.3		6.1	36.3	
Actuated g/C Ratio	0.09	0.14		0.15	0.22		0.09	0.58		0.09	0.58	
v/c Ratio	0.01	0.22		0.44	0.07		0.03	0.29		0.16	0.12	
Control Delay	23.5	17.7		23.0	11.2		23.8	9.0		25.3	9.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.5	17.7		23.0	11.2		23.8	9.0		25.3	9.4	
LOS	C	B		C	B		C	A		C	A	
Approach Delay		17.9			20.6			9.3			11.9	
Approach LOS		B			C			A			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	0	7		18	3		1	20		4	10	
Queue Length 95th (ft)	6	41		82	23		10	134		27	67	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	154	461		268	586		154	1047		154	1089	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.13		0.44	0.05		0.03	0.29		0.16	0.12	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 62.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 37.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 14: Avenue 17 & Road 23

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.947			0.917			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1809	0	1770	1764	0	1770	1708	0	1770	1855	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1809	0	1770	1764	0	1770	1708	0	1770	1855	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			30			91			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	7	84	20	205	51	28	6	180	226	36	183	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	91	22	223	55	30	7	196	246	39	199	5
Lane Group Flow (vph)	8	113	0	223	85	0	7	442	0	39	204	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	15.0	27.0	0.0	9.3	24.4	0.0	9.3	24.4	0.0
Total Split (%)	13.3%	30.4%	0.0%	21.4%	38.6%	0.0%	13.3%	34.9%	0.0%	13.3%	34.9%	0.0%
Maximum Green (s)	4.0	16.0		9.7	21.7		4.0	19.1		4.0	19.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	10.1		10.9	21.1		5.3	25.5		5.3	27.2	
Actuated g/C Ratio	0.08	0.16		0.18	0.35		0.08	0.43		0.08	0.45	
v/c Ratio	0.06	0.37		0.69	0.13		0.05	0.57		0.27	0.24	
Control Delay	30.0	22.1		36.5	10.3		30.0	17.1		32.9	13.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.0	22.1		36.5	10.3		30.0	17.1		32.9	13.7	
LOS	C	C		D	B		C	B		C	B	
Approach Delay		22.6			29.3			17.3			16.8	
Approach LOS		C			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	2	26		64	9		2	82		12	42	
Queue Length 95th (ft)	15	73		#189	46		14	#261		42	115	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	140	471		328	706		140	780		144	845	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.24		0.68	0.12		0.05	0.57		0.27	0.24	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 59.8
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 21.1 Intersection LOS: C
Intersection Capacity Utilization 54.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23

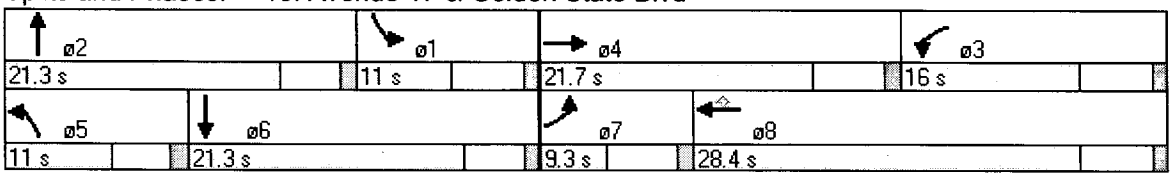
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.983				0.850		0.886			0.935	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3479	0	1736	3471	1553	1492	1391	0	3433	1742	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3479	0	1736	3471	1553	1492	1391	0	3433	1742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18				338		113			16	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	23	392	49	140	545	311	61	33	104	160	19	15
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	25	426	53	152	592	338	66	36	113	174	21	16
Lane Group Flow (vph)	25	479	0	152	592	338	66	149	0	174	37	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.7	0.0	16.0	28.4	28.4	11.0	21.3	0.0	11.0	21.3	0.0
Total Split (%)	13.3%	31.0%	0.0%	22.9%	40.6%	40.6%	15.7%	30.4%	0.0%	15.7%	30.4%	0.0%
Maximum Green (s)	4.0	16.4		10.7	23.1	23.1	6.4	16.7		5.7	16.7	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	17.7		12.0	30.0	30.0	6.8	17.3		7.0	21.7	
Actuated g/C Ratio	0.08	0.25		0.17	0.43	0.43	0.10	0.25		0.10	0.31	
v/c Ratio	0.19	0.54		0.51	0.40	0.39	0.46	0.35		0.51	0.07	
Control Delay	33.9	24.3		26.8	11.0	3.5	40.5	10.0		35.5	14.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	33.9	24.3		26.8	11.0	3.5	40.5	10.0		35.5	14.5	
LOS	C	C		C	B	A	D	A		D	B	
Approach Delay		24.8			10.9			19.4			31.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	10	90		42	18	0	27	12		37	7	
Queue Length 95th (ft)	32	134		101	141	29	64	55		66	28	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	134	893		298	1487	859	149	429		343	551	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.19	0.54		0.51	0.40	0.39	0.44	0.35		0.51	0.07	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 4 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 17.5 Intersection LOS: B
Intersection Capacity Utilization 46.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.987				0.850		0.889			0.942	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3493	0	1656	3312	1482	1736	1624	0	3433	1755	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3493	0	1656	3312	1482	1736	1624	0	3433	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				522		127			30	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	34	875	84	212	819	480	76	85	245	512	49	30
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	37	951	91	230	890	522	83	92	266	557	53	33
Lane Group Flow (vph)	37	1042	0	230	890	522	83	358	0	557	86	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	10.4	37.0	0.0	19.0	45.6	45.6	14.4	22.0	0.0	22.0	29.6	0.0
Total Split (%)	10.4%	37.0%	0.0%	19.0%	45.6%	45.6%	14.4%	22.0%	0.0%	22.0%	29.6%	0.0%
Maximum Green (s)	5.1	31.7		13.7	40.3	40.3	9.8	17.4		16.7	25.0	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead	Lead	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	6.4	33.0		15.0	45.8	45.8	9.6	18.0		18.0	28.5	
Actuated g/C Ratio	0.06	0.33		0.15	0.46	0.46	0.10	0.18		0.18	0.28	
v/c Ratio	0.33	0.90		0.93	0.59	0.54	0.50	0.90		0.90	0.16	
Control Delay	52.9	43.3		66.8	13.5	3.8	53.1	53.6		59.7	20.7	
Queue Delay	0.0	0.0		0.0	0.2	0.5	0.0	0.0		0.0	0.0	
Total Delay	52.9	43.3		66.8	13.6	4.3	53.1	53.6		59.7	20.7	
LOS	D	D		E	B	A	D	D		E	C	
Approach Delay		43.6			18.1			53.5			54.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			B			D			D	
Queue Length 50th (ft)	23	327		147	178	56	51	150		180	28	
Queue Length 95th (ft)	56	#451		m#253	222	52	100	#321		#276	67	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	113	1160		248	1516	961	181	396		618	522	
Starvation Cap Reductn	0	0		0	109	146	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.33	0.90		0.93	0.63	0.64	0.46	0.90		0.90	0.16	

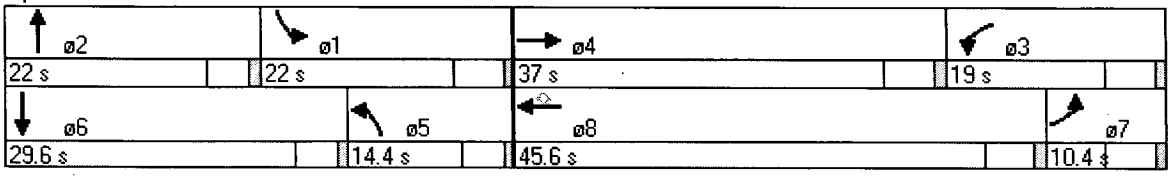
Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 35.6 Intersection LOS: D
Intersection Capacity Utilization 86.1% ICU Level of Service E
Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



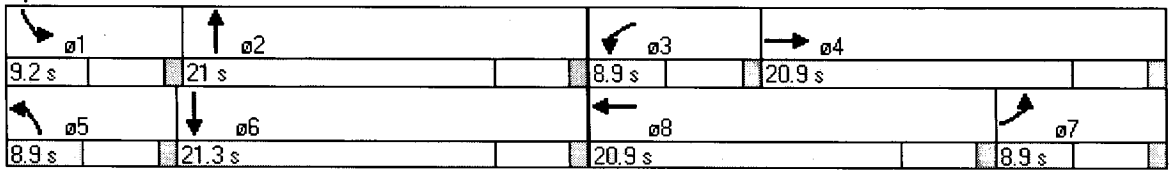
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.878			0.850			0.998			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1545	0	1671	1495	0	1770	3532	0	1770	3518	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1545	0	1671	1495	0	1770	3532	0	1770	3518	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			318			2			6	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	28	3	12	16	0	106	27	658	10	81	358	14
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
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	30	3	13	17	0	115	29	715	11	88	389	15
Lane Group Flow (vph)	30	16	0	17	115	0	29	726	0	88	404	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	8.9	20.9	0.0	8.9	20.9	0.0	8.9	21.0	0.0	9.2	21.3	0.0
Total Split (%)	14.8%	34.8%	0.0%	14.8%	34.8%	0.0%	14.8%	35.0%	0.0%	15.3%	35.5%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	16.1		4.3	16.4	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.2	10.4		5.8	7.8		5.8	35.3		6.3	40.3	
Actuated g/C Ratio	0.10	0.17		0.09	0.13		0.09	0.61		0.10	0.70	
v/c Ratio	0.18	0.06		0.11	0.25		0.18	0.34		0.48	0.16	
Control Delay	22.6	11.0		23.8	1.3		24.7	9.7		28.2	6.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.6	11.0		23.8	1.3		24.7	9.7		28.2	6.2	
LOS	C	B		C	A		C	A		C	A	
Approach Delay		18.6			4.2			10.3			10.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			A			B			B	
Queue Length 50th (ft)	6	1		3	0		6	58		17	13	
Queue Length 95th (ft)	27	14		19	0		28	140		#69	74	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	164	446		150	638		159	2188		183	2457	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.18	0.04		0.11	0.18		0.18	0.33		0.48	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 57.7
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 9.9 Intersection LOS: A
Intersection Capacity Utilization 41.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



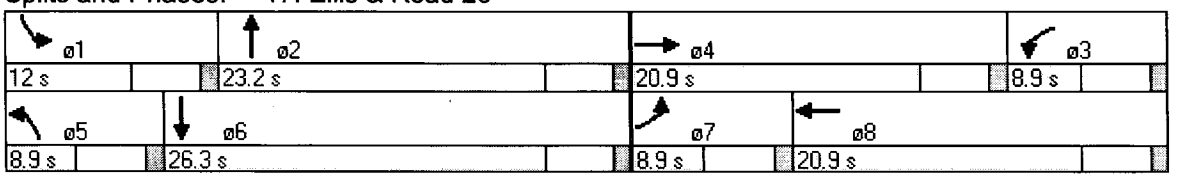
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.931			0.853			0.985			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1734	0	1770	1589	0	1770	3486	0	1770	3490	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1734	0	1770	1589	0	1770	3486	0	1770	3490	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			203			18			18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	38	12	10	48	4	187	39	648	70	174	923	96
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	13	11	52	4	203	42	704	76	189	1003	104
Lane Group Flow (vph)	41	24	0	52	207	0	42	780	0	189	1107	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	8.9	20.9	0.0	8.9	20.9	0.0	8.9	23.2	0.0	12.0	26.3	0.0
Total Split (%)	13.7%	32.2%	0.0%	13.7%	32.2%	0.0%	13.7%	35.7%	0.0%	18.5%	40.5%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.3		7.1	21.4	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	4.9	7.3		8.2	8.1		4.9	20.3		8.2	30.4	
Actuated g/C Ratio	0.09	0.13		0.15	0.16		0.09	0.41		0.16	0.61	
v/c Ratio	0.26	0.10		0.20	0.49		0.27	0.54		0.65	0.52	
Control Delay	28.9	18.8		21.9	8.5		29.1	14.9		35.1	11.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.9	18.8		21.9	8.5		29.1	14.9		35.1	11.9	
LOS	C	B		C	A		C	B		D	B	
Approach Delay		25.2			11.2			15.6			15.3	
Approach LOS		C			B			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	9	3		12	1		9	73		42	50	
Queue Length 95th (ft)	41	22		44	47		41	183		#165	#300	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	158	479		262	596		158	1518		292	2142	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.26	0.05		0.20	0.35		0.27	0.51		0.65	0.52	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 49.7
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 15.2 Intersection LOS: B
Intersection Capacity Utilization 60.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.958			0.985			0.950	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1757	0	1626	1640	0	1504	1560	0	1570	1570	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1757	0	1626	1640	0	1504	1560	0	1570	1570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			29			9			41	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	12	125	29	10	115	44	18	129	15	28	80	40
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	13	136	32	11	125	48	20	140	16	30	87	43
Lane Group Flow (vph)	13	168	0	11	173	0	20	156	0	30	130	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	24.5	0.0	9.9	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	37.7%	0.0%	15.2%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.2		4.6	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.5	11.9		5.5	11.9		5.5	30.2		6.2	32.4	
Actuated g/C Ratio	0.09	0.21		0.09	0.21		0.09	0.56		0.10	0.61	
v/c Ratio	0.08	0.43		0.07	0.46		0.15	0.18		0.18	0.13	
Control Delay	27.0	18.0		27.0	17.9		28.4	10.6		26.5	7.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.0	18.0		27.0	17.9		28.4	10.6		26.5	7.2	
LOS	C	B		C	B		C	B		C	A	
Approach Delay		18.7			18.4			12.7			10.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	3	26		2	25		4	14		6	8	
Queue Length 95th (ft)	20	95		18	95		26	87		34	61	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	156	539		148	512		137	885		163	967	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.31		0.07	0.34		0.15	0.18		0.18	0.13	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 53.5
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 31.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
9.9 s	24.5 s	9.3 s	21.3 s
ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.945			0.987			0.974	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1673	0	1736	1726	0	1703	1769	0	1556	1595	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1673	0	1736	1726	0	1703	1769	0	1556	1595	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			44			7			17	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	33	95	46	19	160	93	51	215	20	74	223	47
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	36	103	50	21	174	101	55	234	22	80	242	51
Lane Group Flow (vph)	36	153	0	21	275	0	55	256	0	80	293	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	10.0	23.4	0.0	11.0	24.4	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	15.4%	36.0%	0.0%	16.9%	37.5%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.7	18.1		5.7	19.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	14.6		5.4	13.1		6.1	24.2		7.1	24.7	
Actuated g/C Ratio	0.09	0.27		0.09	0.24		0.10	0.44		0.12	0.45	
v/c Ratio	0.24	0.32		0.14	0.62		0.31	0.33		0.43	0.40	
Control Delay	31.6	14.2		31.3	22.2		30.9	15.8		33.0	15.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.6	14.2		31.3	22.2		30.9	15.8		33.0	15.8	
LOS	C	B		C	C		C	B		C	B	
Approach Delay		17.6			22.8			18.5			19.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			B			B	
Queue Length 50th (ft)	10	28		6	60		16	53		23	59	
Queue Length 95th (ft)	39	80		27	147		52	142		#70	163	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	149	573		151	547		177	786		187	730	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.24	0.27		0.14	0.50		0.31	0.33		0.43	0.40	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 54.7
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 19.8 Intersection LOS: B
Intersection Capacity Utilization 48.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
11 s	23.4 s	9.3 s	21.3 s
ø5	**ø6**	**ø7**	**ø8**
10 s	24.4 s	9.3 s	21.3 s

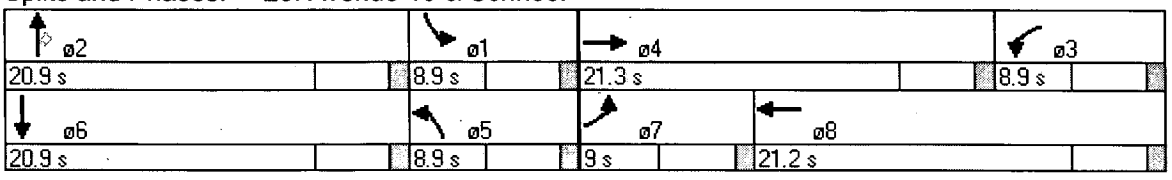
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.903			0.972				0.850		0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1682	0	3400	1793	0	1770	1863	1583	1327	1273	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1682	0	3400	1793	0	1770	1863	1583	1327	1273	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			11				98		29	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		334			571			552			643	
Travel Time (s)		5.7			9.7			9.4			11.0	
Volume (vph)	258	23	42	212	44	10	48	8	90	4	18	27
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
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	36%	36%	36%
Adj. Flow (vph)	280	25	46	230	48	11	52	9	98	4	20	29
Lane Group Flow (vph)	280	71	0	230	59	0	52	9	98	4	49	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9	20.9	8.9	20.9	
Total Split (s)	9.0	21.3	0.0	8.9	21.2	0.0	8.9	20.9	20.9	8.9	20.9	0.0
Total Split (%)	15.0%	35.5%	0.0%	14.8%	35.3%	0.0%	14.8%	34.8%	34.8%	14.8%	34.8%	0.0%
Maximum Green (s)	4.1	16.4		4.0	16.3		4.0	16.0	16.0	4.0	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	9.9	27.4		4.9	22.3		8.2	12.7	12.7	7.4	7.7	
Actuated g/C Ratio	0.16	0.46		0.08	0.37		0.14	0.21	0.21	0.12	0.13	
v/c Ratio	0.49	0.09		0.83	0.09		0.21	0.02	0.24	0.02	0.26	
Control Delay	29.3	7.7		41.7	4.6		24.4	17.8	6.9	22.0	16.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	29.3	7.7		41.7	4.6		24.4	17.8	6.9	22.0	16.8	
LOS	C	A		D	A		C	B	A	C	B	
Approach Delay		24.9			34.1			13.2			17.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	46	5		45	4		17	2	0	1	7	
Queue Length 95th (ft)	#111	31		#88	m13		42	13	34	8	31	
Internal Link Dist (ft)		254			491			472			563	
Turn Bay Length (ft)												
Base Capacity (vph)	568	792		278	675		243	569	551	163	379	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.49	0.09		0.83	0.09		0.21	0.02	0.18	0.02	0.13	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 48 (80%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 25.4 Intersection LOS: C
Intersection Capacity Utilization 30.0% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Avenue 16 & Schnoor



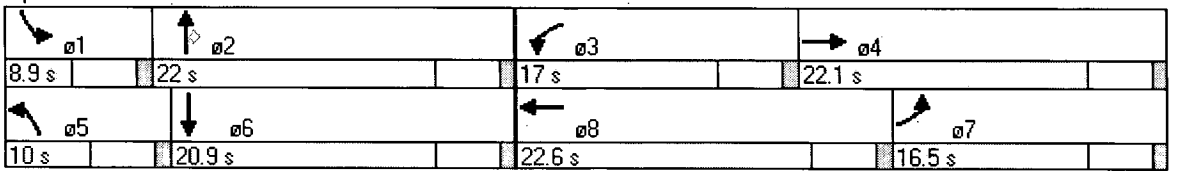
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.893			0.965				0.850		0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1663	0	3433	1798	0	1597	1681	1429	1770	1699	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1663	0	3433	1798	0	1597	1681	1429	1770	1699	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		116			21				230		41	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		334			571			552			643	
Travel Time (s)		5.7			9.7			9.4			11.0	
Volume (vph)	323	43	107	515	81	25	81	15	212	8	27	38
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	351	47	116	560	88	27	88	16	230	9	29	41
Lane Group Flow (vph)	351	163	0	560	115	0	88	16	230	9	70	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9	20.9	8.9	20.9	
Total Split (s)	16.5	22.1	0.0	17.0	22.6	0.0	10.0	22.0	22.0	8.9	20.9	0.0
Total Split (%)	23.6%	31.6%	0.0%	24.3%	32.3%	0.0%	14.3%	31.4%	31.4%	12.7%	29.9%	0.0%
Maximum Green (s)	11.6	17.2		12.1	17.7		5.1	17.1	17.1	4.0	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	12.5	22.5		19.1	29.2		6.0	14.5	14.5	4.9	8.3	
Actuated g/C Ratio	0.18	0.32		0.27	0.42		0.09	0.21	0.21	0.07	0.12	
v/c Ratio	0.57	0.27		0.60	0.15		0.64	0.05	0.48	0.07	0.29	
Control Delay	30.5	8.9		12.5	4.7		54.7	21.7	7.5	31.9	17.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	30.5	8.9		12.5	4.7		54.7	21.7	7.5	31.9	17.5	
LOS	C	A		B	A		D	C	A	C	B	
Approach Delay		23.7			11.2			20.6			19.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			C			B	
Queue Length 50th (ft)	72	15		42	8		38	5	0	4	12	
Queue Length 95th (ft)	111	59		73	m20		#101	21	53	17	42	
Internal Link Dist (ft)		254			491			472			563	
Turn Bay Length (ft)												
Base Capacity (vph)	613	614		939	762		137	435	540	124	441	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.57	0.27		0.60	0.15		0.64	0.04	0.43	0.07	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 66 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 17.5 Intersection LOS: B
Intersection Capacity Utilization 44.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Avenue 16 & Schnoor



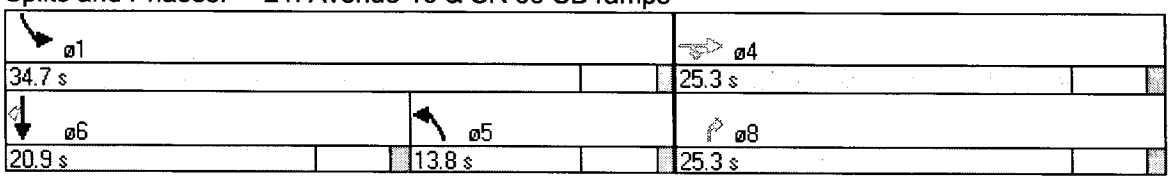
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1845	1568	0	0	0	3072	0	1417	1703	1792	1524
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1845	1568	0	0	0	3072	0	1417	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			414						7	2		214
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		571			228			1041			580	
Travel Time (s)		9.7			5.2			17.7			13.2	
Volume (vph)	0	130	381	0	0	0	239	0	6	2	105	197
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
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	14%	14%	14%	6%	6%	6%
Adj. Flow (vph)	0	141	414	0	0	0	260	0	7	2	114	214
Lane Group Flow (vph)	0	141	414	0	0	0	260	0	7	2	114	214
Turn Type			custom				Prot		custom	Prot		Perm
Protected Phases							5			1	6	
Permitted Phases		4	4						8			6
Detector Phases		4	4				5		8	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				8.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	25.3	25.3	0.0	0.0	0.0	13.8	0.0	25.3	34.7	20.9	20.9
Total Split (%)	0.0%	42.2%	42.2%	0.0%	0.0%	0.0%	23.0%	0.0%	42.2%	57.8%	34.8%	34.8%
Maximum Green (s)		20.4	20.4				8.9		20.4	29.8	16.0	16.0
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		C-Max	C-Max				None		C-Max	None	None	None
Walk Time (s)		5.0	5.0						5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0						11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0						0		0	0
Act Effct Green (s)		27.0	27.0				11.2		27.0	11.3	9.8	9.8
Actuated g/C Ratio		0.45	0.45				0.19		0.45	0.19	0.16	0.16
v/c Ratio		0.17	0.44				0.45		0.01	0.01	0.39	0.50
Control Delay		11.9	3.2				19.2		15.0	9.5	25.7	8.1
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		11.9	3.2				19.2		15.0	9.5	25.7	8.1
LOS		B	A				B		B	A	C	A
Approach Delay		5.4									14.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A									B	
Queue Length 50th (ft)		29	0				48		1	0	37	0
Queue Length 95th (ft)		65	40				63		m8	3	74	46
Internal Link Dist (ft)		491			148			961			500	
Turn Bay Length (ft)												
Base Capacity (vph)		831	934				591		642	872	505	583
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.17	0.44				0.44		0.01	0.00	0.23	0.37

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 4:EBT and 8:NBR, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 11.1 Intersection LOS: B
Intersection Capacity Utilization 35.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



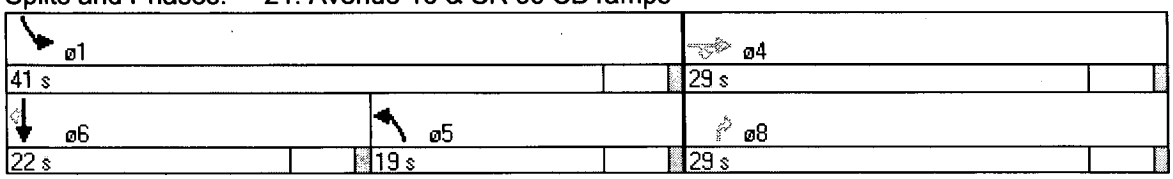
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1863	1583	0	0	0	3433	0	1583	1736	1827	1553
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	0	0	3433	0	1583	1736	1827	1553
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			704						11	3		507
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		571			228			1041			580	
Travel Time (s)		9.7			5.2			17.7			13.2	
Volume (vph)	0	285	675	0	0	0	524	0	10	3	190	466
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	310	734	0	0	0	570	0	11	3	207	507
Lane Group Flow (vph)	0	310	734	0	0	0	570	0	11	3	207	507
Turn Type			custom				Prot		custom	Prot		Perm
Protected Phases							5			1	6	
Permitted Phases		4	4						8			6
Detector Phases		4	4				5		8	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				8.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	29.0	29.0	0.0	0.0	0.0	19.0	0.0	29.0	41.0	22.0	22.0
Total Split (%)	0.0%	41.4%	41.4%	0.0%	0.0%	0.0%	27.1%	0.0%	41.4%	58.6%	31.4%	31.4%
Maximum Green (s)		24.1	24.1				14.1		24.1	36.1	17.1	17.1
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		C-Max	C-Max				None		C-Max	None	None	None
Walk Time (s)		5.0	5.0						5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0						11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0						0		0	0
Act Effct Green (s)		27.8	27.8				16.0		27.8	12.5	14.1	14.1
Actuated g/C Ratio		0.40	0.40				0.23		0.40	0.18	0.20	0.20
v/c Ratio		0.42	0.70				0.73		0.02	0.01	0.56	0.71
Control Delay		18.6	6.3				21.9		11.0	10.3	30.5	8.5
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		18.6	6.3				21.9		11.0	10.3	30.5	8.5
LOS		B	A				C		B	B	C	A
Approach Delay		10.0									14.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A									B	
Queue Length 50th (ft)		99	8				92		2	0	80	0
Queue Length 95th (ft)		171	112				#146		m4	3	133	71
Internal Link Dist (ft)		491			148			961			500	
Turn Bay Length (ft)												
Base Capacity (vph)		741	1054				786		636	919	470	776
Starvation Cap Reductn		0	2				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.42	0.70				0.73		0.02	0.00	0.44	0.65

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 56 (80%), Referenced to phase 4:EBT and 8:NBR, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 14.4 Intersection LOS: B
Intersection Capacity Utilization 58.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



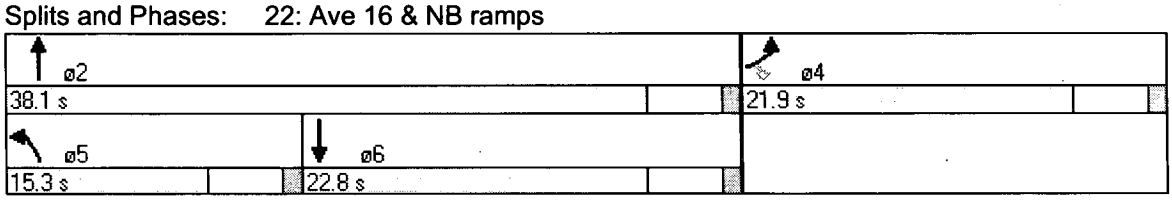
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.871	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3367	1553	1656	1743	1547	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3367	1553	1656	1743	1547	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		224			145	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1041			475	543	
Travel Time (s)	23.7			10.8	12.3	
Volume (vph)	280	206	112	145	6	133
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	9%	9%	7%	7%
Adj. Flow (vph)	304	224	122	158	7	145
Lane Group Flow (vph)	304	224	122	158	152	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Detector Phases	4	4	5	2	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.9	20.9	8.9	20.9	20.9	
Total Split (s)	21.9	21.9	15.3	38.1	22.8	0.0
Total Split (%)	36.5%	36.5%	25.5%	63.5%	38.0%	0.0%
Maximum Green (s)	17.0	17.0	10.4	33.2	17.9	
Yellow Time (s)	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Min	C-Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	13.1	13.1	10.6	38.9	26.4	
Actuated g/C Ratio	0.22	0.22	0.18	0.65	0.44	
v/c Ratio	0.41	0.43	0.42	0.14	0.20	
Control Delay	17.5	4.8	25.4	5.1	4.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.5	4.8	25.4	5.1	4.5	
LOS	B	A	C	A	A	
Approach Delay	12.1			14.0	4.5	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			B	A	
Queue Length 50th (ft)	35	0	40	21	2	
Queue Length 95th (ft)	73	35	75	41	37	
Internal Link Dist (ft)	961			395	463	
Turn Bay Length (ft)						
Base Capacity (vph)	1004	620	336	1129	766	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.30	0.36	0.36	0.14	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 40 (67%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.43
Intersection Signal Delay: 11.5 Intersection LOS: B
Intersection Capacity Utilization 32.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 22: Ave 16 & NB ramps



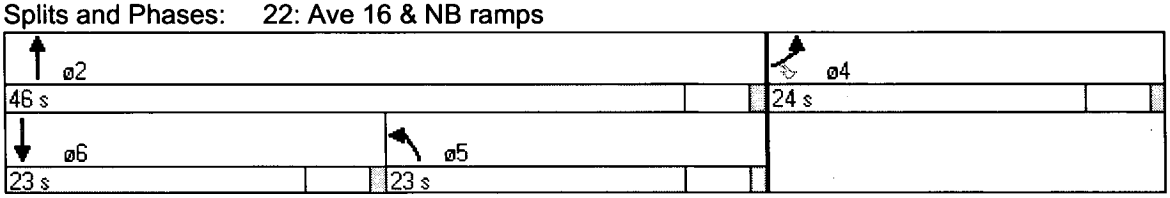
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.869	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3347	1534	1643	1729	1531	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3347	1534	1643	1729	1531	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		458			325	
Headway Factor	1.01	1.02	1.01	1.01	1.01	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1041			475	543	
Travel Time (s)	23.7			10.8	12.3	
Volume (vph)	444	421	235	213	10	299
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	9%	9%	7%	7%
Bus Blockages (#/hr)	3	3	2	2	2	2
Adj. Flow (vph)	483	458	255	232	11	325
Lane Group Flow (vph)	483	458	255	232	336	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Detector Phases	4	4	5	2	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.9	20.9	8.9	20.9	20.9	
Total Split (s)	24.0	24.0	23.0	46.0	23.0	0.0
Total Split (%)	34.3%	34.3%	32.9%	65.7%	32.9%	0.0%
Maximum Green (s)	19.1	19.1	18.1	41.1	18.1	
Yellow Time (s)	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Min	C-Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	17.2	17.2	16.4	44.8	24.3	
Actuated g/C Ratio	0.25	0.25	0.23	0.64	0.35	
v/c Ratio	0.59	0.63	0.66	0.21	0.45	
Control Delay	23.5	5.8	32.1	6.7	5.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.5	5.8	32.1	6.7	5.7	
LOS	C	A	C	A	A	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	14.9			20.0	5.7	
Approach LOS	B			B	A	
Queue Length 50th (ft)	64	0	100	46	3	
Queue Length 95th (ft)	147	120	153	72	65	
Internal Link Dist (ft)	961			395	463	
Turn Bay Length (ft)						
Base Capacity (vph)	984	774	462	1120	757	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.49	0.59	0.55	0.21	0.44	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 14.6 Intersection LOS: B
Intersection Capacity Utilization 54.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 22: Ave 16 & NB ramps



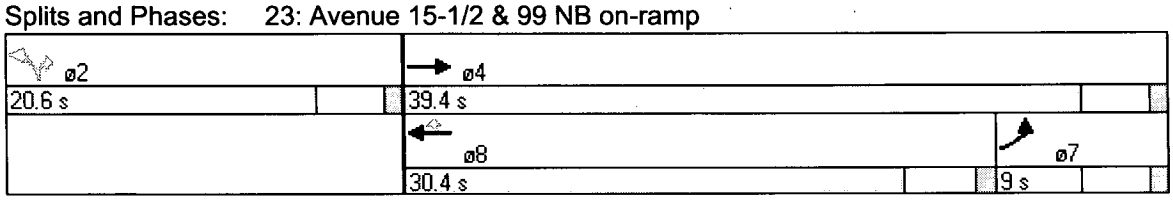
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						203			200			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	124	705	0	0	1025	187	344	0	184	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	135	766	0	0	1114	203	374	0	200	0	0	0
Lane Group Flow (vph)	135	766	0	0	1114	203	374	0	200	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	9.0	39.4	0.0	0.0	30.4	30.4	20.6	0.0	20.6	0.0	0.0	0.0
Total Split (%)	15.0%	65.7%	0.0%	0.0%	50.7%	50.7%	34.3%	0.0%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	4.4	34.8			25.8	25.8	16.0		16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	5.0	39.3			32.1	32.1	12.7		12.7			
Actuated g/C Ratio	0.08	0.66			0.54	0.54	0.21		0.21			
v/c Ratio	0.47	0.33			0.60	0.22	0.54		0.42			
Control Delay	31.6	2.2			12.7	2.5	23.6		6.2			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	31.6	2.2			12.7	2.5	23.6		6.2			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A	C		A			
Approach Delay		6.6			11.1							
Approach LOS		A			B							
Queue Length 50th (ft)	28	31			140	0	62		0			
Queue Length 95th (ft)	54	42			233	30	90		41			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	286	2317			1856	925	897		558			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.47	0.33			0.60	0.22	0.42		0.36			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 1 (2%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 11.0 Intersection LOS: B
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



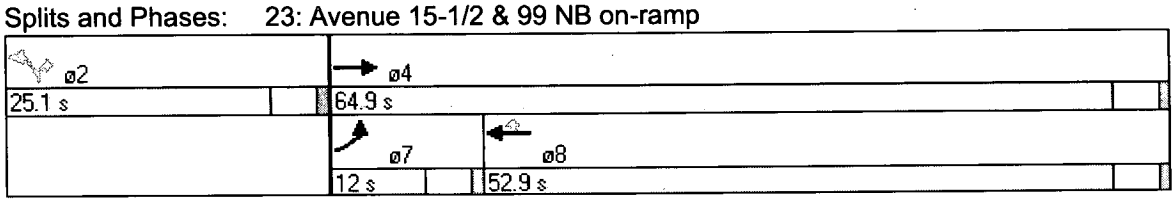
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						368			23			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	238	1770	0	0	1679	339	699	0	311	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	259	1924	0	0	1825	368	760	0	338	0	0	0
Lane Group Flow (vph)	259	1924	0	0	1825	368	760	0	338	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	12.0	64.9	0.0	0.0	52.9	52.9	25.1	0.0	25.1	0.0	0.0	0.0
Total Split (%)	13.3%	72.1%	0.0%	0.0%	58.8%	58.8%	27.9%	0.0%	27.9%	0.0%	0.0%	0.0%
Maximum Green (s)	7.4	60.3			48.3	48.3	20.5		20.5			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	8.0	60.9			48.9	48.9	21.1		21.1			
Actuated g/C Ratio	0.09	0.68			0.54	0.54	0.23		0.23			
v/c Ratio	0.85	0.80			0.95	0.36	0.95		0.88			
Control Delay	64.8	3.8			31.9	2.2	57.6		56.2			
Queue Delay	0.0	0.7			0.8	0.0	0.0		0.0			
Total Delay	64.8	4.5			32.8	2.2	57.6		56.2			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			C	A	E		E			
Approach Delay		11.6			27.7							
Approach LOS		B			C							
Queue Length 50th (ft)	82	123			484	0	220		174			
Queue Length 95th (ft)	m#100	117			#679	38	#335		#330			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	305	2395			1923	1028	797		385			
Starvation Cap Reductn	0	183			0	0	0		0			
Spillback Cap Reductn	0	0			21	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.85	0.87			0.96	0.36	0.95		0.88			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 10 (11%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 122.8% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Mitigated 2008 Project Alt B AM
24: Avenue 15-1/2 & 99 SB off-ramp 7/22/2006

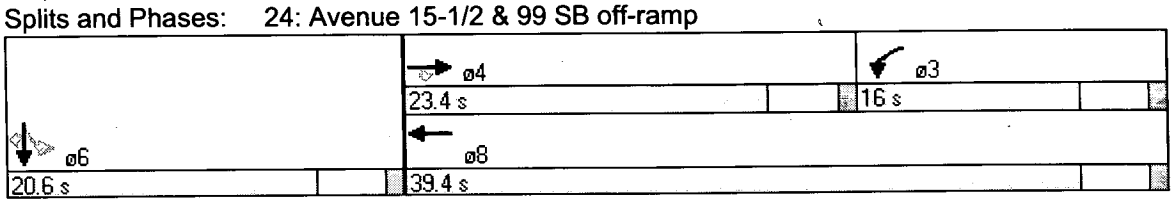
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			385									91
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	671	354	361	1008	0	0	0	0	163	1	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	729	385	392	1096	0	0	0	0	177	1	91
Lane Group Flow (vph)	0	729	385	392	1096	0	0	0	0	89	89	91
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	23.4	23.4	16.0	39.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	39.0%	39.0%	26.7%	65.7%	0.0%	0.0%	0.0%	0.0%	34.3%	34.3%	34.3%
Maximum Green (s)		18.8	18.8	11.4	34.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		27.1	27.1	12.0	43.1					8.9	8.9	8.9
Actuated g/C Ratio		0.45	0.45	0.20	0.72					0.15	0.15	0.15
v/c Ratio		0.46	0.42	0.58	0.44					0.36	0.35	0.29
Control Delay		13.0	3.1	19.4	1.4					26.2	26.2	8.4
Queue Delay		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Total Delay		13.0	3.1	19.4	1.4					26.2	26.2	8.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B	A	B	A					C	C	A
Approach Delay		9.6			6.1						20.2	
Approach LOS		A			A						C	
Queue Length 50th (ft)		90	0	71	0					30	30	0
Queue Length 95th (ft)		145	44	91	17					65	65	31
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1596	925	673	2491					465	466	504
Starvation Cap Reductn		0	0	0	0					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.46	0.42	0.58	0.44					0.19	0.19	0.18

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 8.8 Intersection LOS: A
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Mitigated 2008 Project Alt B PM
24: Avenue 15-1/2 & 99 SB off-ramp

7/22/2006

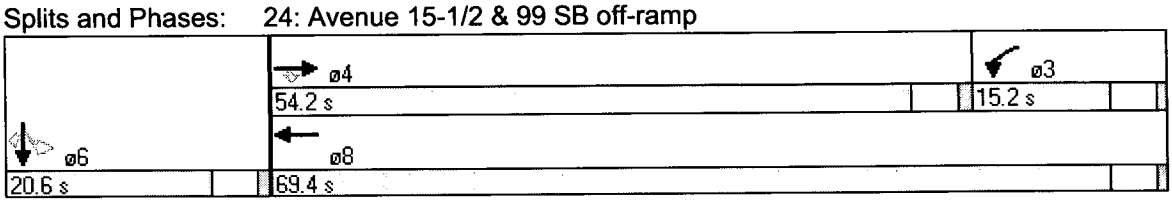
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			625									15
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1597	575	296	2082	0	0	0	0	397	1	199
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1736	625	322	2263	0	0	0	0	432	1	216
Lane Group Flow (vph)	0	1736	625	322	2263	0	0	0	0	216	217	216
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	54.2	54.2	15.2	69.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	60.2%	60.2%	16.9%	77.1%	0.0%	0.0%	0.0%	0.0%	22.9%	22.9%	22.9%
Maximum Green (s)		49.6	49.6	10.6	64.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		51.6	51.6	11.2	66.8					15.2	15.2	15.2
Actuated g/C Ratio		0.57	0.57	0.12	0.74					0.17	0.17	0.17
v/c Ratio		0.86	0.53	0.75	0.86					0.76	0.76	0.77
Control Delay		22.1	2.7	38.5	7.5					53.5	53.6	52.3
Queue Delay		0.0	0.0	0.0	1.5					0.0	0.0	0.0
Total Delay		22.1	2.7	38.5	9.1					53.5	53.6	52.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	D	A					D	D	D
Approach Delay		17.0			12.7						53.1	
Approach LOS		B			B						D	
Queue Length 50th (ft)		421	0	91	227					122	123	108
Queue Length 95th (ft)		538	45	m94	m247					#223	#223	#208
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		2029	1174	427	2627					310	311	304
Starvation Cap Reductn		0	0	0	199					0	0	0
Spillback Cap Reductn		5	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.86	0.53	0.75	0.93					0.70	0.70	0.71

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 122.8% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



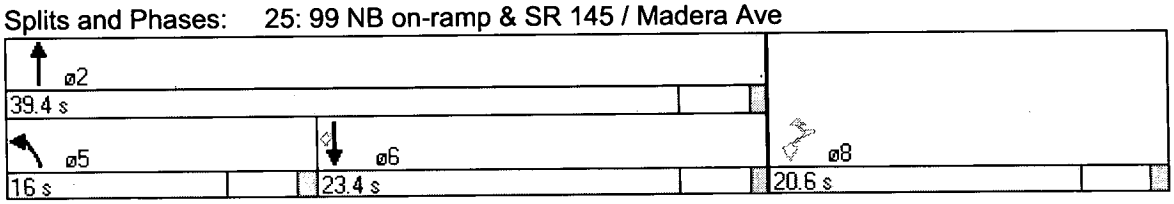
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46						483
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	377	0	42	382	502	0	0	165	444
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	410	0	46	415	546	0	0	179	483
Lane Group Flow (vph)	0	0	0	410	0	46	415	546	0	0	179	483
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	16.0	39.4	0.0	0.0	23.4	23.4
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	26.7%	65.7%	0.0%	0.0%	39.0%	39.0%
Maximum Green (s)				16.0		16.0	11.4	34.8			18.8	18.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				12.7		12.7	12.2	39.3			23.1	23.1
Actuated g/C Ratio				0.21		0.21	0.20	0.66			0.38	0.38
v/c Ratio				0.56		0.12	0.59	0.45			0.25	0.53
Control Delay				23.9		7.1	23.8	6.5			15.2	4.3
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				23.9		7.1	23.8	6.5			15.2	4.3
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								14.0			7.3	
Approach LOS								B			A	
Queue Length 50th (ft)				69		0	75	90			44	0
Queue Length 95th (ft)				97		20	101	161			91	56
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				950		471	731	1220			716	906
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.43		0.10	0.57	0.45			0.25	0.53

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 33 (55%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 13.6 Intersection LOS: B
Intersection Capacity Utilization 45.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Mitigated 2008 Project Alt A PM
25: 99 NB on-ramp & SR 145 / Madera Ave 7/22/2006

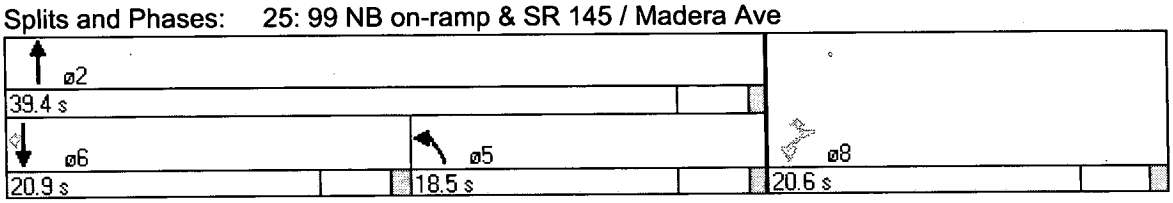
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41						484
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	250	0	38	600	685	0	0	259	445
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	272	0	41	652	745	0	0	282	484
Lane Group Flow (vph)	0	0	0	272	0	41	652	745	0	0	282	484
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	18.5	39.4	0.0	0.0	20.9	20.9
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	30.8%	65.7%	0.0%	0.0%	34.8%	34.8%
Maximum Green (s)				16.0		16.0	13.9	34.8			16.3	16.3
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				10.3		10.3	14.8	41.7			22.9	22.9
Actuated g/C Ratio				0.17		0.17	0.25	0.70			0.38	0.38
v/c Ratio				0.46		0.13	0.77	0.58			0.40	0.54
Control Delay				24.6		8.6	23.1	4.8			16.3	4.2
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				24.6		8.6	23.1	4.8			16.3	4.2
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								13.3			8.7	
Approach LOS								B			A	
Queue Length 50th (ft)				46		0	99	76			75	0
Queue Length 95th (ft)				73		21	m126	m99			136	54
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				950		468	863	1295			712	904
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.29		0.09	0.76	0.58			0.40	0.54

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 2 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 51.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



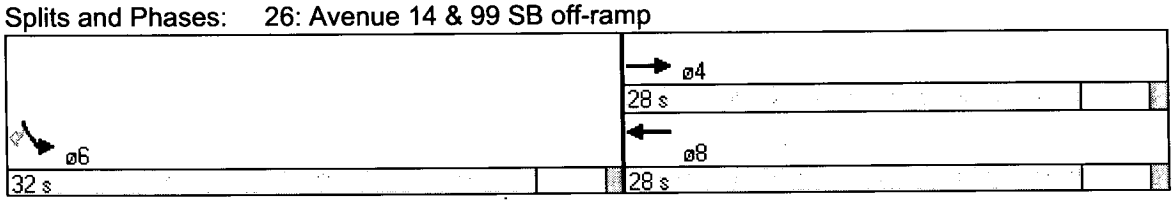
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						249
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	434	417	0	491	300
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	472	453	0	534	326
Lane Group Flow (vph)	0	472	453	0	534	326
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	28.0	28.0	0.0	32.0	32.0
Total Split (%)	0.0%	46.7%	46.7%	0.0%	53.3%	53.3%
Maximum Green (s)		23.4	23.4		27.4	27.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		28.8	28.8		23.2	23.2
Actuated g/C Ratio		0.48	0.48		0.39	0.39
v/c Ratio		0.53	0.51		0.79	0.43
Control Delay		15.1	8.4		24.8	4.9
Queue Delay		0.0	1.1		0.0	0.0
Total Delay		15.1	9.5		24.8	4.9
LOS		B	A		C	A
Approach Delay		15.1	9.5		17.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		B	
Queue Length 50th (ft)		116	40		158	17
Queue Length 95th (ft)		220	93		234	54
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		895	895		818	865
Starvation Cap Reductn		0	234		0	0
Spillback Cap Reductn		8	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.53	0.69		0.65	0.38

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 14.7 Intersection LOS: B
Intersection Capacity Utilization 56.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



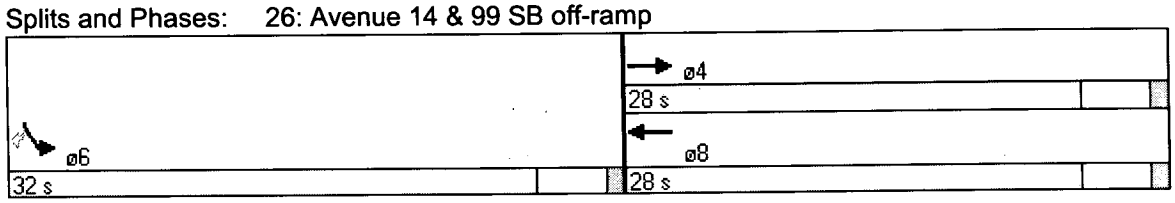
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						200
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	561	314	0	652	184
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	610	341	0	709	200
Lane Group Flow (vph)	0	610	341	0	709	200
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	28.0	28.0	0.0	32.0	32.0
Total Split (%)	0.0%	46.7%	46.7%	0.0%	53.3%	53.3%
Maximum Green (s)		23.4	23.4		27.4	27.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		25.4	25.4		26.6	26.6
Actuated g/C Ratio		0.42	0.42		0.44	0.44
v/c Ratio		0.77	0.43		0.91	0.25
Control Delay		24.5	6.7		33.0	2.6
Queue Delay		0.7	1.3		0.4	0.0
Total Delay		25.2	8.1		33.4	2.6
LOS		C	A		C	A
Approach Delay		25.2	8.1		26.6	
Approach LOS		C	A		C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		189	46		214	0
Queue Length 95th (ft)		#358	81		#413	28
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		790	790		826	845
Starvation Cap Reductn		0	263		0	0
Spillback Cap Reductn		36	0		11	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.81	0.65		0.87	0.24

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 8 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 22.7 Intersection LOS: C
Intersection Capacity Utilization 72.3% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.998	
Satd. Flow (prot)	3335	1810	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted	0.950						0.950				0.840	
Satd. Flow (perm)	3335	1810	1538	0	0	0	1752	1845	1568	0	2944	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			583						21			285
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	268	114	543	0	0	0	155	617	19	11	269	262
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	291	124	590	0	0	0	168	671	21	12	292	285
Lane Group Flow (vph)	291	124	590	0	0	0	168	671	21	0	304	285
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	24.0	24.0	24.0	0.0	0.0	0.0	14.0	36.0	36.0	22.0	22.0	22.0
Total Split (%)	40.0%	40.0%	40.0%	0.0%	0.0%	0.0%	23.3%	60.0%	60.0%	36.7%	36.7%	36.7%
Maximum Green (s)	19.4	19.4	19.4				9.4	31.4	31.4	17.4	17.4	17.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	11.4	11.4	11.4				9.6	40.6	40.6		29.1	29.1
Actuated g/C Ratio	0.19	0.19	0.19				0.16	0.68	0.68		0.48	0.48
v/c Ratio	0.46	0.36	0.77				0.60	0.54	0.02		0.21	0.31
Control Delay	25.3	24.4	10.1				32.9	8.1	2.8		4.2	2.4
Queue Delay	0.2	0.3	0.6				0.0	0.0	0.0		0.0	0.1
Total Delay	25.5	24.7	10.7				32.9	8.1	2.8		4.2	2.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	B				C	A	A		A	A
Approach Delay		16.7						12.8			3.4	
Approach LOS		B						B			A	
Queue Length 50th (ft)	52	43	27				55	84	0		16	0
Queue Length 95th (ft)	m58	m53	m60				#114	269	8		35	12
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1112	603	901				302	1250	1069		1430	908
Starvation Cap Reductn	298	179	90				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	140
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.36	0.29	0.73				0.56	0.54	0.02		0.21	0.37

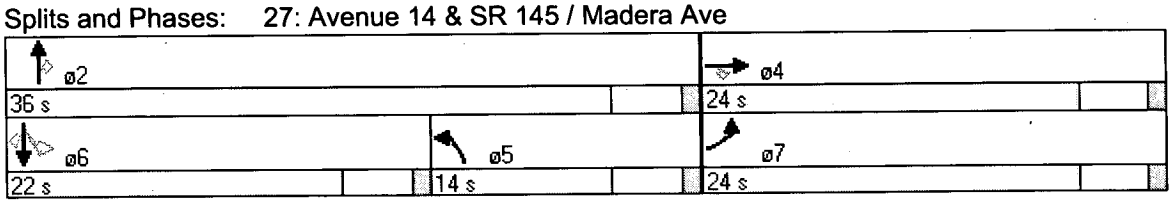
Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 12.2 Intersection LOS: B
Intersection Capacity Utilization 57.9% ICU Level of Service B
Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.997	
Satd. Flow (prot)	3367	1827	1553	0	0	0	1770	1863	1583	0	3529	1583
Flt Permitted	0.950						0.950				0.682	
Satd. Flow (perm)	3367	1827	1553	0	0	0	1770	1863	1583	0	2414	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			575						17			208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	318	187	708	0	0	0	123	967	16	19	295	191
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	346	203	770	0	0	0	134	1051	17	21	321	208
Lane Group Flow (vph)	346	203	770	0	0	0	134	1051	17	0	342	208
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	20.6	20.6	20.6	0.0	0.0	0.0	14.1	39.4	39.4	25.3	25.3	25.3
Total Split (%)	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%	23.5%	65.7%	65.7%	42.2%	42.2%	42.2%
Maximum Green (s)	16.0	16.0	16.0				9.5	34.8	34.8	20.7	20.7	20.7
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	15.2	15.2	15.2				10.9	36.8	36.8		24.0	24.0
Actuated g/C Ratio	0.25	0.25	0.25				0.18	0.61	0.61		0.40	0.40
v/c Ratio	0.41	0.44	0.94				0.42	0.92	0.02		0.35	0.27
Control Delay	19.9	20.7	20.5				26.2	27.1	2.8		7.6	3.3
Queue Delay	3.9	12.5	31.8				0.0	0.0	0.0		0.0	0.1
Total Delay	23.8	33.2	52.2				26.2	27.1	2.8		7.6	3.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	D				C	C	A		A	A
Approach Delay		41.8						26.6			6.0	
Approach LOS		D						C			A	
Queue Length 50th (ft)	53	61	70				43	313	0		39	0
Queue Length 95th (ft)	m66	m77	m#211				90	#598	6		62	26
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	932	505	846				344	1143	978		1027	793
Starvation Cap Reductn	490	273	121				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	87
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.78	0.88	1.06				0.39	0.92	0.02		0.33	0.29

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 29.5 Intersection LOS: C
Intersection Capacity Utilization 79.4% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave

ATTACHMENT VI – C - 21

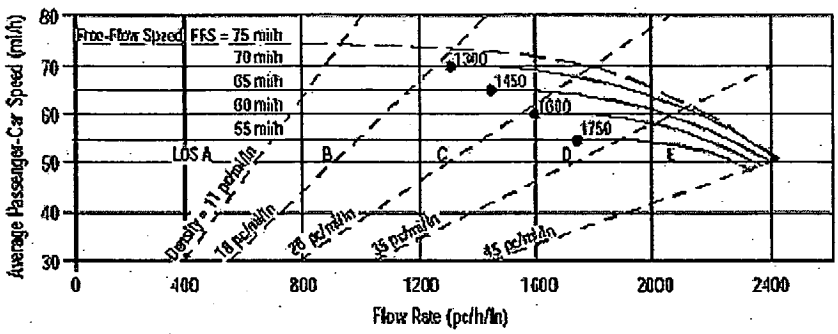
MITIGATED OPENING DAY (2008)

PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2753*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

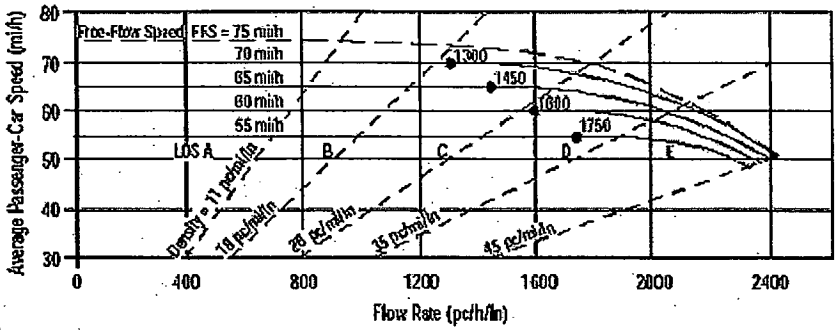
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1121*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*16.0*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2926*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

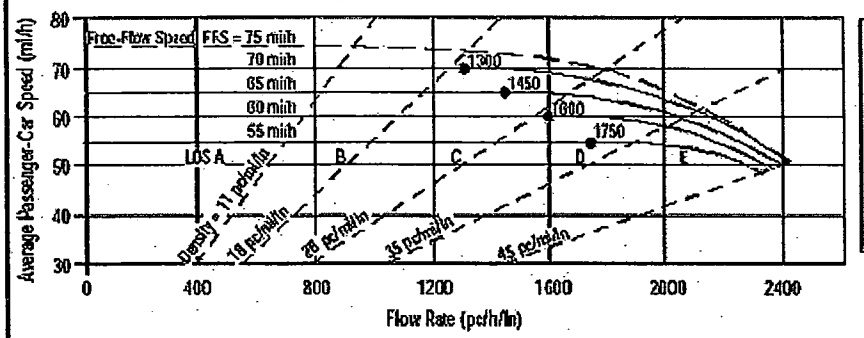
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1192*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*17.0*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/16/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2308*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

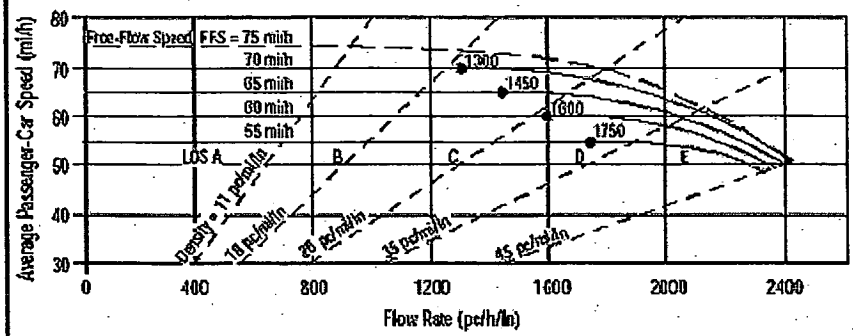
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*940*	pc/h/ln	Design LOS	
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*13.4*	pc/mi/ln	S	mi/h
LOS	*B*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3500*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

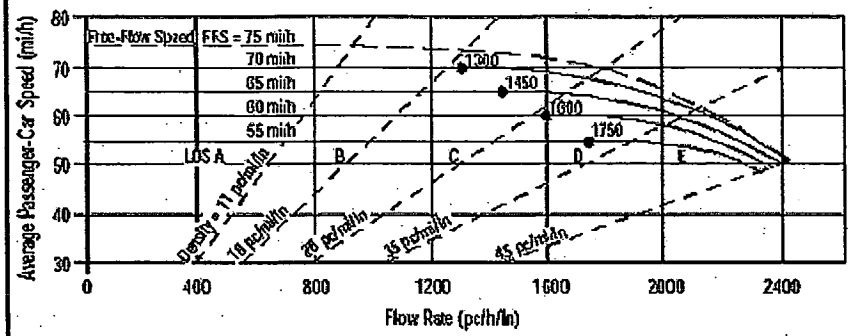
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1425*	pc/h/ln	Design LOS		
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*20.4*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*2975*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

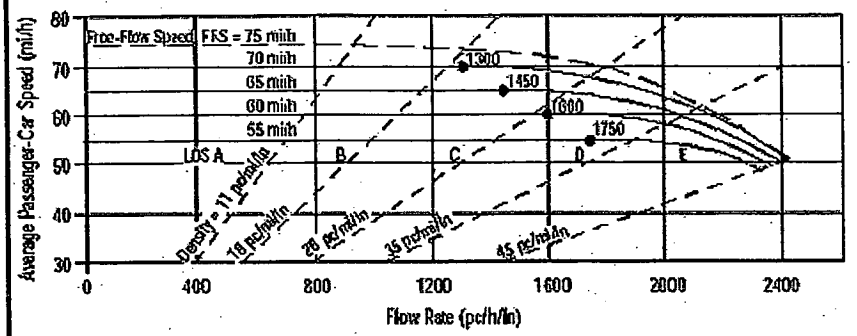
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1212*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*17.3*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period		Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*3083*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

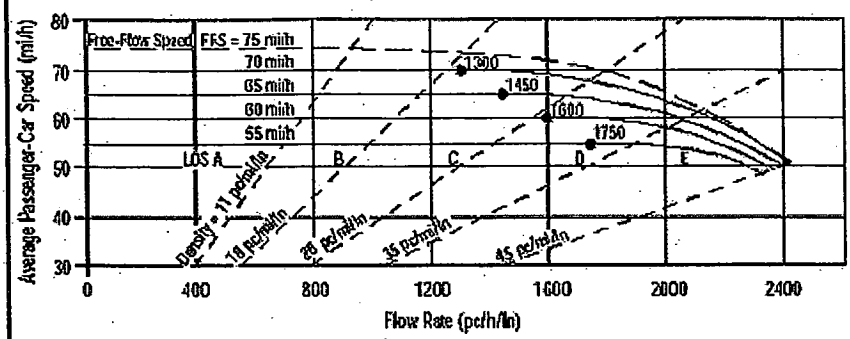
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1256*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*17.9*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2463*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1003*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*14.3*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

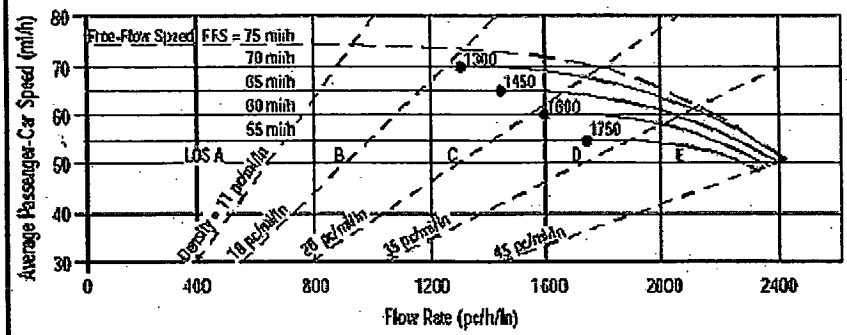
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2008 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3715*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1513*	pc/h/ln
S	*69.8*	mi/h
D = v_p / S	*21.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

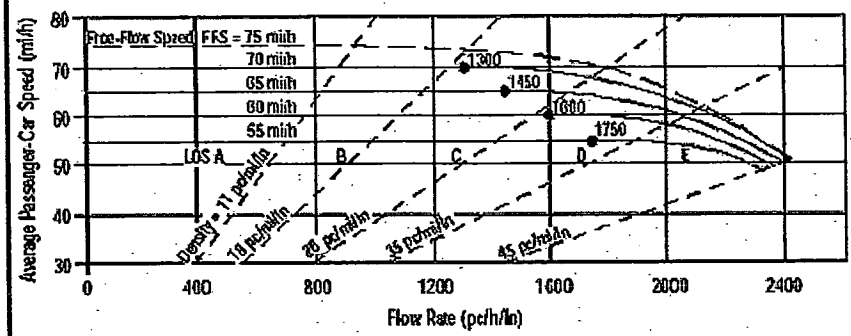
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3460*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1409*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*20.1*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

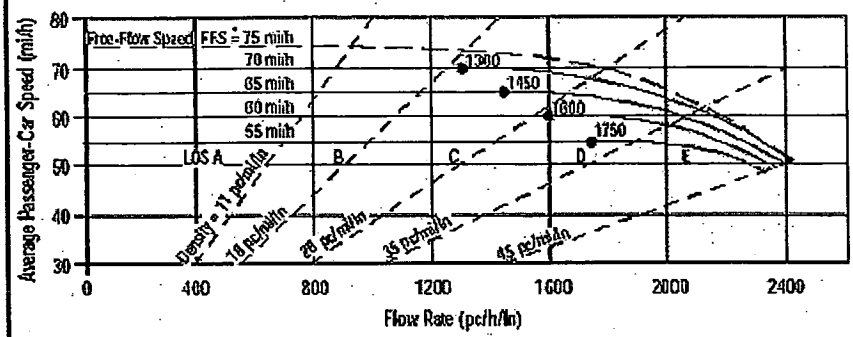
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4263*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

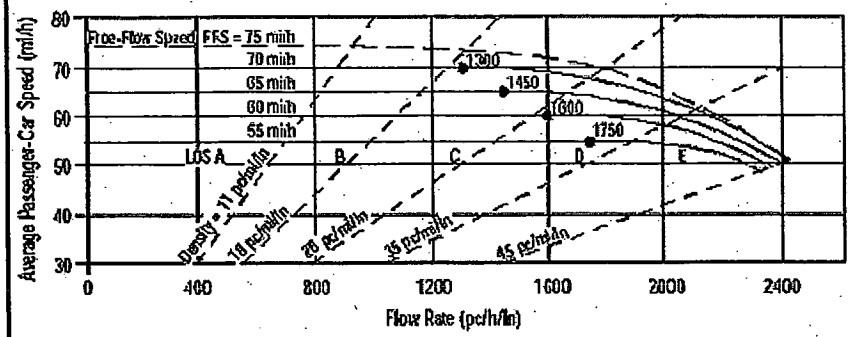
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1736*	pc/h/ln	Design LOS	
S	*68.5*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*25.3*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2749*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*840*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*12.0*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

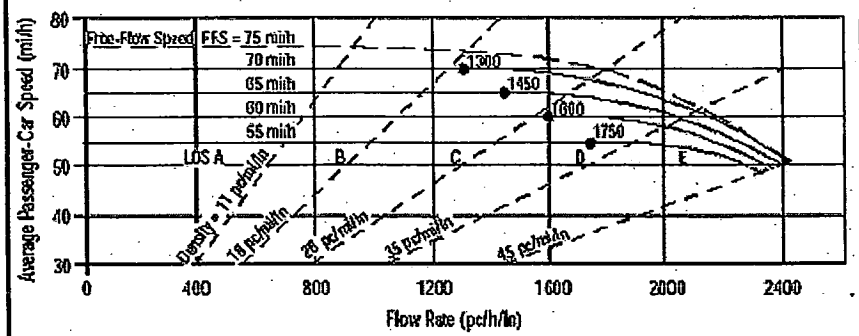
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2008 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4855*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1483*	pc/h/ln
S	*69.8*	mi/h
D = v_p / S	*21.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 22

MITIGATED OPENING DAY (2008)

PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		25	0		0
Storage Lanes	0		0	1		0	1		1	0		0
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
Leading Detector (ft)		50		50	50		50		50	50	50	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979							0.850		0.956	
Flt Protected				0.950			0.950				0.997	
Satd. Flow (prot)	0	1442	0	1480	1557	0	1504	0	1346	0	1322	0
Flt Permitted				0.950			0.536				0.997	
Satd. Flow (perm)	0	1442	0	1480	1557	0	849	0	1346	0	1322	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20							158		41	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		285			942			3168			3472	
Travel Time (s)		5.6			18.4			72.0			78.9	
Volume (vph)	0	355	67	33	256	0	66	0	139	12	123	66
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	29%	22%	22%	22%	20%	20%	20%	37%	37%	37%
Adj. Flow (vph)	0	403	76	38	291	0	75	0	158	14	140	75
Lane Group Flow (vph)	0	479	0	38	291	0	75	0	158	0	229	0
Turn Type				Prot			custom		custom	Perm		
Protected Phases		4		3	8						6	
Permitted Phases							2		2	6		
Detector Phases		4		3	8		2		2	6	6	
Minimum Initial (s)		4.0		4.0	4.0		4.0		4.0	4.0	4.0	
Minimum Split (s)		20.9		8.6	20.9		20.9		20.9	20.9	20.9	
Total Split (s)	0.0	30.4	0.0	8.6	39.0	0.0	21.0	0.0	21.0	21.0	21.0	0.0
Total Split (%)	0.0%	50.7%	0.0%	14.3%	65.0%	0.0%	35.0%	0.0%	35.0%	35.0%	35.0%	0.0%
Maximum Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
Yellow Time (s)		3.6		3.6	3.6		3.6		3.6	3.6	3.6	
All-Red Time (s)		1.0		1.0	1.0		1.0		1.0	1.0	1.0	
Lead/Lag		Lead		Lag								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode		C-Max		None	C-Max		Max		Max	Max	Max	
Act Effct Green (s)		29.8		4.6	35.0		17.0		17.0		17.0	
Actuated g/C Ratio		0.50		0.08	0.58		0.28		0.28		0.28	
v/c Ratio		0.66		0.34	0.32		0.31		0.32		0.57	
Control Delay		18.2		21.5	1.8		21.3		5.5		21.4	
Queue Delay		1.2		0.0	0.0		0.0		0.0		0.0	
Total Delay		19.3		21.5	1.8		21.3		5.5		21.4	
LOS		B		C	A		C		A		C	
Approach Delay		19.3			4.1						21.4	
Approach LOS		B			A						C	

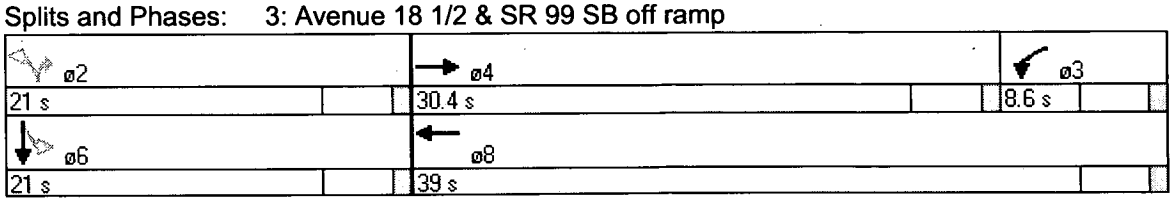
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
90th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
70th %ile Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
70th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
50th %ile Green (s)		25.8		4.0	34.4		16.4		16.4	16.4	16.4	
50th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
30th %ile Green (s)		34.4		0.0	34.4		16.4		16.4	16.4	16.4	
30th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
10th %ile Green (s)		34.4		0.0	34.4		16.4		16.4	16.4	16.4	
10th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
Queue Length 50th (ft)		131		13	7		21		0		56	
Queue Length 95th (ft)		#246		m21	m9		52		35		116	
Internal Link Dist (ft)		205			862			3088			3392	
Turn Bay Length (ft)									25			
Base Capacity (vph)		728		113	908		241		495		404	
Starvation Cap Reductn		95		0	0		0		0		0	
Spillback Cap Reductn		0		0	0		0		0		0	
Storage Cap Reductn		0		0	0		0		0		0	
Reduced v/c Ratio		0.76		0.34	0.32		0.31		0.32		0.57	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 50 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 14.1 Intersection LOS: B
Intersection Capacity Utilization 52.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		25	0		0
Storage Lanes	0		0	1		0	1		1	0		0
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
Leading Detector (ft)		50		50	50		50		50	50	50	
Trailing Detector (ft)		0		0	0		0		0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977							0.850		0.952	
Flt Protected				0.950			0.950				0.995	
Satd. Flow (prot)	0	1439	0	1480	1557	0	1504	0	1346	0	1314	0
Flt Permitted				0.950			0.385				0.995	
Satd. Flow (perm)	0	1439	0	1480	1557	0	610	0	1346	0	1314	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18							260		44	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		285			942			3168			3472	
Travel Time (s)		5.6			18.4			72.0			78.9	
Volume (vph)	0	372	76	51	288	0	65	0	229	36	192	127
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	29%	22%	22%	22%	20%	20%	20%	37%	37%	37%
Adj. Flow (vph)	0	423	86	58	327	0	74	0	260	41	218	144
Lane Group Flow (vph)	0	509	0	58	327	0	74	0	260	0	403	0
Turn Type				Prot			custom		custom	Perm		
Protected Phases		4		3	8						6	
Permitted Phases							2		2	6		
Detector Phases		4		3	8		2		2	6	6	
Minimum Initial (s)		4.0		4.0	4.0		4.0		4.0	4.0	4.0	
Minimum Split (s)		20.9		8.6	20.9		20.9		20.9	20.9	20.9	
Total Split (s)	0.0	33.0	0.0	9.0	42.0	0.0	28.0	0.0	28.0	28.0	28.0	0.0
Total Split (%)	0.0%	47.1%	0.0%	12.9%	60.0%	0.0%	40.0%	0.0%	40.0%	40.0%	40.0%	0.0%
Maximum Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
Yellow Time (s)		3.6		3.6	3.6		3.6		3.6	3.6	3.6	
All-Red Time (s)		1.0		1.0	1.0		1.0		1.0	1.0	1.0	
Lead/Lag		Lead		Lag								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0		3.0		3.0	3.0	3.0	
Recall Mode		C-Max		None	C-Max		Max		Max	Max	Max	
Act Effct Green (s)		32.6		5.0	38.0		24.0		24.0		24.0	
Actuated g/C Ratio		0.47		0.07	0.54		0.34		0.34		0.34	
v/c Ratio		0.75		0.55	0.39		0.35		0.41		0.84	
Control Delay		25.5		38.5	1.6		23.2		4.7		37.4	
Queue Delay		4.7		0.0	0.0		0.0		0.0		0.0	
Total Delay		30.2		38.5	1.6		23.2		4.7		37.4	
LOS		C		D	A		C		A		D	
Approach Delay		30.2			7.1						37.4	
Approach LOS		C			A						D	

J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
90th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
70th %ile Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
70th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
50th %ile Green (s)		28.4		4.4	37.4		23.4		23.4	23.4	23.4	
50th %ile Term Code		Coord		Max	Coord		MaxR		MaxR	MaxR	MaxR	
30th %ile Green (s)		37.4		0.0	37.4		23.4		23.4	23.4	23.4	
30th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
10th %ile Green (s)		37.4		0.0	37.4		23.4		23.4	23.4	23.4	
10th %ile Term Code		Coord		Skip	Coord		MaxR		MaxR	MaxR	MaxR	
Queue Length 50th (ft)		184		27	3		23		0		141	
Queue Length 95th (ft)		#344		m39	m3		57		42		#285	
Internal Link Dist (ft)		205			862			3088			3392	
Turn Bay Length (ft)									25			
Base Capacity (vph)		680		106	845		209		632		479	
Starvation Cap Reductn		111		0	0		0		0		0	
Spillback Cap Reductn		0		0	0		0		0		0	
Storage Cap Reductn		0		0	0		0		0		0	
Reduced v/c Ratio		0.89		0.55	0.39		0.35		0.41		0.84	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 65 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 22.1 Intersection LOS: C
Intersection Capacity Utilization 68.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp

ø2	ø4	ø3
28 s	33 s	9 s
ø6	ø8	
28 s	42 s	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.973				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1220	1284	0	0	1696	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1220	1284	0	0	1696	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					21				15			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	204	59	0	0	95	24	242	0	22	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	232	67	0	0	108	27	275	0	25	0	0	0
Lane Group Flow (vph)	232	67	0	0	135	0	0	275	25	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	18.0	39.1	0.0	0.0	21.1	0.0	20.9	20.9	20.9	0.0	0.0	0.0
Total Split (%)	30.0%	65.2%	0.0%	0.0%	35.2%	0.0%	34.8%	34.8%	34.8%	0.0%	0.0%	0.0%
Maximum Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	14.0	36.5			18.5			15.5	15.5			
Actuated g/C Ratio	0.23	0.61			0.31			0.26	0.26			
v/c Ratio	0.81	0.09			0.25			0.80	0.08			
Control Delay	37.1	2.4			15.4			39.7	11.2			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	37.1	2.4			15.4			39.7	11.2			

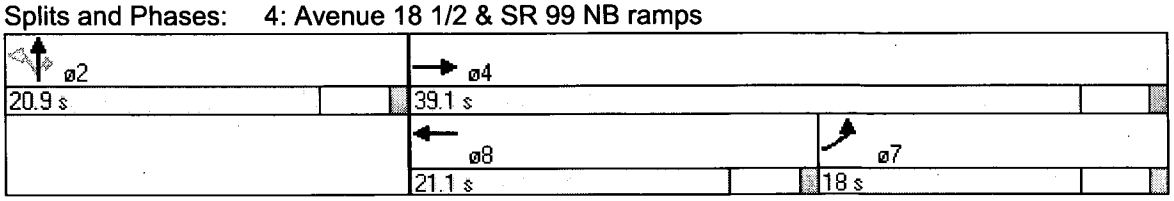
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			B			D	B			
Approach Delay		29.3			15.4			37.3				
Approach LOS		C			B			D				
90th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	13.4	34.5			16.5		16.3	16.3	16.3			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	13.4	36.0			18.0		14.8	14.8	14.8			
30th %ile Term Code	Max	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	13.4	40.2			22.2		10.6	10.6	10.6			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	81	3			31			89	3			
Queue Length 95th (ft)	m#165	m8			68			#187	17			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	285	782			538			377	348			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.81	0.09			0.25			0.73	0.07			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 30.0 Intersection LOS: C
Intersection Capacity Utilization 38.0% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1480	1557	0	0	1637	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1480	1557	0	0	1637	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5				23			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	278	97	0	0	130	10	285	0	46	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	316	110	0	0	148	11	324	0	52	0	0	0
Lane Group Flow (vph)	316	110	0	0	159	0	0	324	52	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	24.0	46.0	0.0	0.0	22.0	0.0	24.0	24.0	24.0	0.0	0.0	0.0
Total Split (%)	34.3%	65.7%	0.0%	0.0%	31.4%	0.0%	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	20.0	43.7			19.7			18.3	18.3			
Actuated g/C Ratio	0.29	0.62			0.28			0.26	0.26			
v/c Ratio	0.75	0.11			0.34			0.83	0.14			
Control Delay	25.6	3.3			22.8			43.1	13.3			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	25.6	3.3			22.8			43.1	13.3			

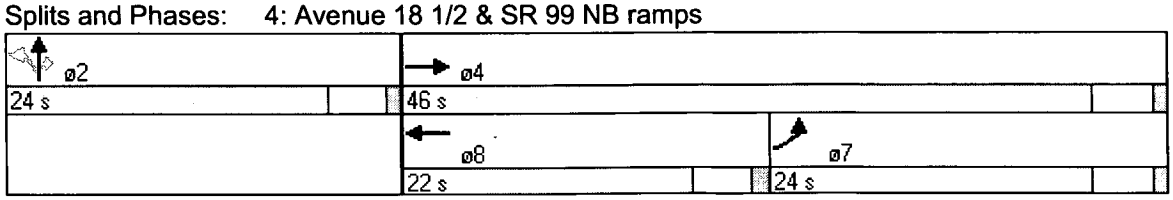
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		19.8			22.8			39.0				
Approach LOS		B			C			D				
90th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	19.4	41.4			17.4		19.4	19.4	19.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	19.4	43.6			19.6		17.2	17.2	17.2			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	19.4	47.9			23.9		12.9	12.9	12.9			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	97	8			54			126	9			
Queue Length 95th (ft)	m#172	m18			102			#236	32			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	423	973			465			430	401			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.75	0.11			0.34			0.75	0.13			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.8 Intersection LOS: C
Intersection Capacity Utilization 48.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



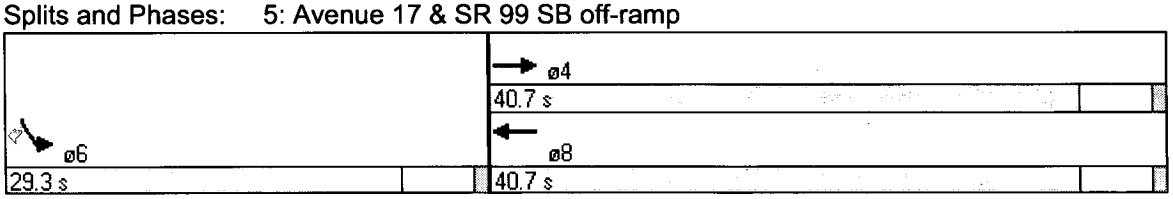
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3374	3505	0	1703	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	3374	3505	0	1703	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						70
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	755	948	0	135	62
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	858	1077	0	153	70
Lane Group Flow (vph)	0	858	1077	0	153	70
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	40.7	40.7	0.0	29.3	29.3
Total Split (%)	0.0%	58.1%	58.1%	0.0%	41.9%	41.9%
Maximum Green (s)		35.4	35.4		24.0	24.0
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		49.7	49.7		12.3	12.3
Actuated g/C Ratio		0.71	0.71		0.18	0.18
v/c Ratio		0.36	0.43		0.51	0.22
Control Delay		1.6	2.2		31.6	8.1
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		1.6	2.2		31.6	8.1
LOS		A	A		C	A
Approach Delay		1.6	2.2		24.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)		15	3		61	0
Queue Length 95th (ft)		31	48		102	27
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2395	2489		616	596
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.36	0.43		0.25	0.12

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 66 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 4.2 Intersection LOS: A
Intersection Capacity Utilization 53.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



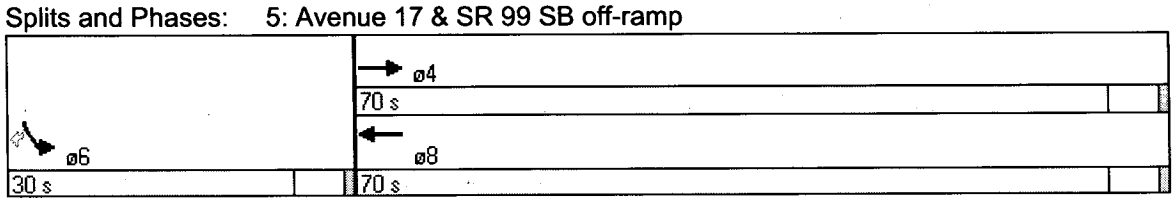
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3343	0	1671	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3343	0	1671	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						26
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1757	1597	0	282	74
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	1997	1815	0	320	84
Lane Group Flow (vph)	0	1997	1815	0	320	84
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	70.0	70.0	0.0	30.0	30.0
Total Split (%)	0.0%	70.0%	70.0%	0.0%	30.0%	30.0%
Maximum Green (s)		64.7	64.7		24.7	24.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		68.6	68.6		23.4	23.4
Actuated g/C Ratio		0.69	0.69		0.23	0.23
v/c Ratio		0.84	0.79		0.82	0.23
Control Delay		3.6	7.8		53.6	22.7
Queue Delay		0.4	0.0		0.0	0.0
Total Delay		4.0	7.8		53.6	22.7
LOS		A	A		D	C
Approach Delay		4.0	7.8		47.1	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		D	
Queue Length 50th (ft)		68	275		188	29
Queue Length 95th (ft)		m74	m326		#282	66
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2381	2293		434	408
Starvation Cap Reductn		93	0		0	0
Spillback Cap Reductn		0	1		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.87	0.79		0.74	0.21

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 94 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 76.1% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



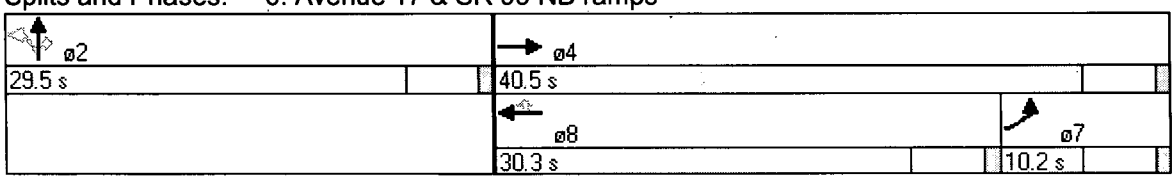
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.957				
Satd. Flow (prot)	1752	3505	0	0	3539	1583	1681	1694	2787	0	0	0
Flt Permitted	0.950						0.950	0.957				
Satd. Flow (perm)	1752	3505	0	0	3539	1583	1681	1694	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73			308			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	42	306	0	0	786	64	612	36	271	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	48	348	0	0	893	73	695	41	308	0	0	0
Lane Group Flow (vph)	48	348	0	0	893	73	358	378	308	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	10.2	40.5	0.0	0.0	30.3	30.3	29.5	29.5	29.5	0.0	0.0	0.0
Total Split (%)	14.6%	57.9%	0.0%	0.0%	43.3%	43.3%	42.1%	42.1%	42.1%	0.0%	0.0%	0.0%
Maximum Green (s)	4.9	35.2			25.0	25.0	24.2	24.2	24.2			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	6.2	40.3			34.2	34.2	21.7	21.7	21.7			
Actuated g/C Ratio	0.09	0.58			0.49	0.49	0.31	0.31	0.31			
v/c Ratio	0.31	0.17			0.52	0.09	0.69	0.72	0.29			
Control Delay	23.2	3.5			15.9	4.5	27.8	29.2	2.9			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	23.2	3.5			15.9	4.5	27.8	29.2	2.9			
LOS	C	A			B	A	C	C	A			
Approach Delay		5.9			15.0			21.0				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			B			C				
Queue Length 50th (ft)	14	14			156	0	134	144	0			
Queue Length 95th (ft)	m38	24			218	22	206	220	23			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	155	2017			1727	810	612	617	1211			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.31	0.17			0.52	0.09	0.58	0.61	0.25			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 62 (89%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 16.1 Intersection LOS: B
Intersection Capacity Utilization 53.0% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



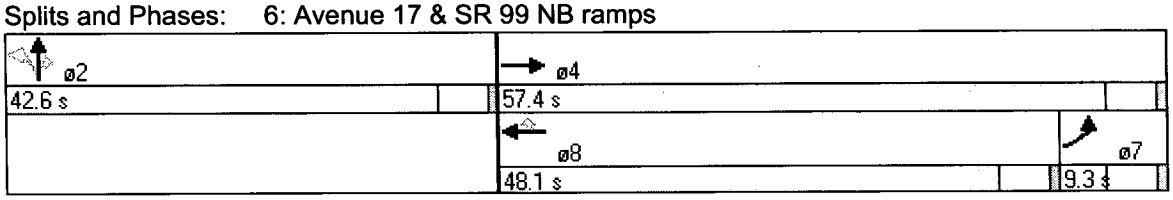
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.950				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1681	2787	0	0	0
Flt Permitted	0.950						0.950	0.950				
Satd. Flow (perm)	1770	3539	0	0	3539	1583	1681	1681	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						197			167			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	57	865	0	0	1322	194	947	0	1011	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	65	983	0	0	1502	220	1076	0	1149	0	0	0
Lane Group Flow (vph)	65	983	0	0	1502	220	538	538	1149	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	9.3	57.4	0.0	0.0	48.1	48.1	42.6	42.6	42.6	0.0	0.0	0.0
Total Split (%)	9.3%	57.4%	0.0%	0.0%	48.1%	48.1%	42.6%	42.6%	42.6%	0.0%	0.0%	0.0%
Maximum Green (s)	4.0	52.1			42.8	42.8	37.3	37.3	37.3			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	5.3	53.4			46.0	46.0	38.6	38.6	38.6			
Actuated g/C Ratio	0.05	0.53			0.46	0.46	0.39	0.39	0.39			
v/c Ratio	0.69	0.52			0.92	0.26	0.83	0.83	0.98			
Control Delay	64.0	13.8			37.1	4.3	40.5	40.5	47.7			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	64.0	13.8			37.1	4.3	40.5	40.5	47.7			
LOS	E	B			D	A	D	D	D			
Approach Delay		16.9			32.9			44.2				
Approach LOS		B			C			D				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	40	135			476	8	321	321	358			
Queue Length 95th (ft)	m49	162			#616	47	#492	#492	#505			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	94	1890			1627	834	649	649	1178			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.69	0.52			0.92	0.26	0.83	0.83	0.98			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 3 (3%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 34.6 Intersection LOS: C
Intersection Capacity Utilization 76.1% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



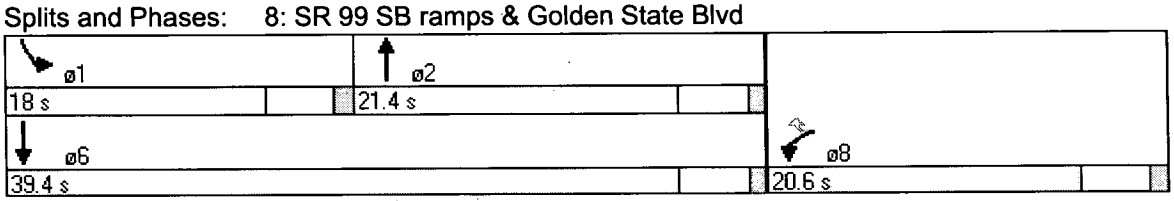
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.921			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1626	1455	1716	0	1770	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1626	1455	1716	0	1770	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		243	119			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	64	214	89	125	209	25
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	73	243	101	142	238	28
Lane Group Flow (vph)	73	243	243	0	238	28
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	20.6	20.6	21.4	0.0	18.0	39.4
Total Split (%)	34.3%	34.3%	35.7%	0.0%	30.0%	65.7%
Maximum Green (s)	16.0	16.0	16.8		13.4	34.8
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	8.9	8.9	25.3		13.9	43.1
Actuated g/C Ratio	0.15	0.15	0.42		0.23	0.72
v/c Ratio	0.30	0.58	0.31		0.58	0.02
Control Delay	25.2	9.5	1.9		25.6	3.2
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	25.2	9.5	1.9		25.6	3.2
LOS	C	A	A		C	A
Approach Delay	13.1		1.9			23.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		A			C
Queue Length 50th (ft)	24	0	2		77	2
Queue Length 95th (ft)	51	46	m16		118	9
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	450	578	801		457	1340
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.16	0.42	0.30		0.52	0.02

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 1 (2%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 37.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



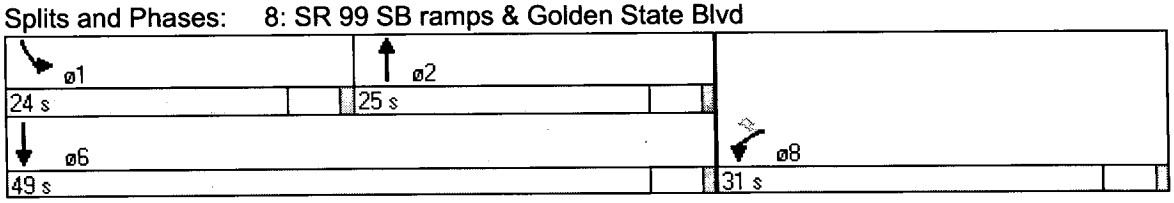
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.930			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1538	1732	0	1641	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1538	1732	0	1641	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		710	65			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	171	625	143	152	246	35
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	194	710	162	173	280	40
Lane Group Flow (vph)	194	710	335	0	280	40
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	31.0	31.0	25.0	0.0	24.0	49.0
Total Split (%)	38.8%	38.8%	31.3%	0.0%	30.0%	61.3%
Maximum Green (s)	26.4	26.4	20.4		19.4	44.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.8	16.8	33.2		18.1	55.2
Actuated g/C Ratio	0.21	0.21	0.42		0.23	0.69
v/c Ratio	0.54	0.80	0.44		0.76	0.03
Control Delay	32.3	9.9	2.1		42.3	5.9
Queue Delay	0.0	0.0	0.3		0.0	0.0
Total Delay	32.3	9.9	2.4		42.3	5.9
LOS	C	A	A		D	A
Approach Delay	14.7		2.4			37.8

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		A			D
Queue Length 50th (ft)	88	0	1		129	5
Queue Length 95th (ft)	122	64	m30		204	21
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	580	989	757		421	1192
Starvation Cap Reductn	0	0	94		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.33	0.72	0.51		0.67	0.03

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 5 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 16.8 Intersection LOS: B
Intersection Capacity Utilization 62.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



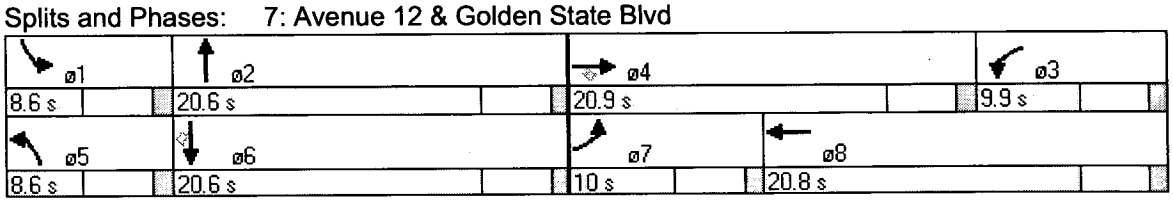
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.986			0.852				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1767	0	1612	1445	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		8			313				24
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	180	249	24	83	292	29	70	5	288	62	5	22
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	196	271	26	90	317	32	76	5	313	67	5	24
Lane Group Flow (vph)	196	271	26	90	349	0	76	318	0	67	5	24
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	10.0	20.9	20.9	9.9	20.8	0.0	8.6	20.6	0.0	8.6	20.6	20.6
Total Split (%)	16.7%	34.8%	34.8%	16.5%	34.7%	0.0%	14.3%	34.3%	0.0%	14.3%	34.3%	34.3%
Maximum Green (s)	5.4	16.3	16.3	5.3	16.2		4.0	16.0		4.0	16.0	16.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	14.2	28.5	28.5	5.9	18.2		4.6	10.4		4.6	8.7	8.7
Actuated g/C Ratio	0.24	0.48	0.48	0.10	0.30		0.08	0.17		0.08	0.14	0.14
v/c Ratio	0.50	0.33	0.04	0.54	0.65		0.61	0.62		0.51	0.02	0.10
Control Delay	30.6	14.4	6.5	29.9	17.2		51.1	9.1		29.5	11.2	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	30.6	14.4	6.5	29.9	17.2		51.1	9.1		29.5	11.2	6.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B	A	C	B		D	A		C	B	A
Approach Delay		20.4			19.8			17.2			22.9	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	59	61	0	34	65		27	2		26	2	0
Queue Length 95th (ft)	#181	142	14	m#58	#111		#83	55		#33	m5	19
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	389	820	711	167	541		124	626		132	501	443
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.33	0.04	0.54	0.65		0.61	0.51		0.51	0.01	0.05

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 8 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 19.5 Intersection LOS: B
Intersection Capacity Utilization 62.0% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



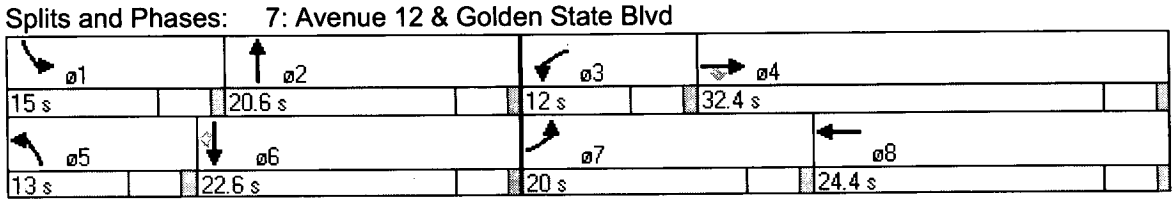
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996			0.855				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1785	0	1687	1518	0	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1785	0	1687	1518	0	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		2			313				36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	276	418	14	101	344	10	149	9	288	175	9	33
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	300	454	15	110	374	11	162	10	313	190	10	36
Lane Group Flow (vph)	300	454	15	110	385	0	162	323	0	190	10	36
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	20.0	32.4	32.4	12.0	24.4	0.0	13.0	20.6	0.0	15.0	22.6	22.6
Total Split (%)	25.0%	40.5%	40.5%	15.0%	30.5%	0.0%	16.3%	25.8%	0.0%	18.8%	28.3%	28.3%
Maximum Green (s)	15.4	27.8	27.8	7.4	19.8		8.4	16.0		10.4	18.0	18.0
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	19.3	36.1	36.1	10.0	24.6		9.0	9.2		10.9	11.1	11.1
Actuated g/C Ratio	0.24	0.45	0.45	0.12	0.31		0.11	0.12		0.14	0.14	0.14
v/c Ratio	0.74	0.57	0.02	0.52	0.70		0.85	0.72		0.82	0.04	0.15
Control Delay	41.4	22.2	8.6	51.8	27.2		73.5	14.0		45.2	14.4	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	41.4	22.2	8.6	51.8	27.2		73.5	14.0		45.2	14.4	10.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	C		E	B		D	B	B
Approach Delay		29.4			32.7			33.9			38.6	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	129	166	0	60	127		81	5		100	5	4
Queue Length 95th (ft)	#289	302	12	m#115	#312		#187	71		#207	m9	m24
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	410	802	690	216	550		190	563		232	413	378
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.57	0.02	0.51	0.70		0.85	0.57		0.82	0.02	0.10

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 18 (23%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 32.4 Intersection LOS: C
Intersection Capacity Utilization 75.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



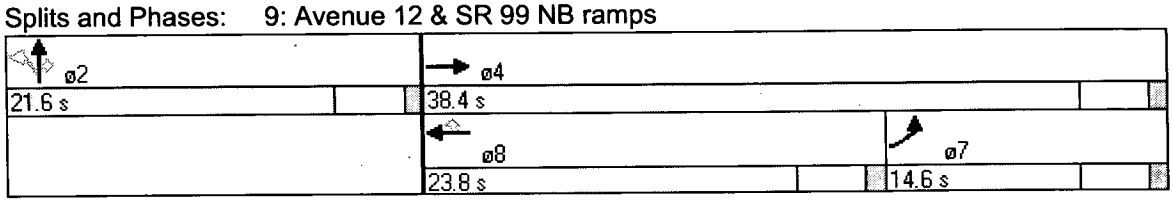
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						417			89			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	104	495	0	0	249	367	155	4	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	118	562	0	0	283	417	176	5	89	0	0	0
Lane Group Flow (vph)	118	562	0	0	283	417	0	181	89	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	14.6	38.4	0.0	0.0	23.8	23.8	21.6	21.6	21.6	0.0	0.0	0.0
Total Split (%)	24.3%	64.0%	0.0%	0.0%	39.7%	39.7%	36.0%	36.0%	36.0%	0.0%	0.0%	0.0%
Maximum Green (s)	10.0	33.8			19.2	19.2	17.0	17.0	17.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.8	39.9			28.2	28.2		12.1	12.1			
Actuated g/C Ratio	0.16	0.66			0.47	0.47		0.20	0.20			
v/c Ratio	0.41	0.46			0.33	0.44		0.55	0.25			
Control Delay	22.1	4.5			14.0	3.5		27.3	6.6			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	22.1	4.5			14.0	3.5		27.3	6.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		C	A			
Approach Delay		7.5			7.7			20.5				
Approach LOS		A			A			C				
Queue Length 50th (ft)	39	61			67	0		59	0			
Queue Length 95th (ft)	m61	97			134	47		99	26			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	310	1226			858	951		475	486			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.38	0.46			0.33	0.44		0.38	0.18			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 9.7 Intersection LOS: A
Intersection Capacity Utilization 47.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						541			149			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	114	767	0	0	280	476	174	1	131	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	130	872	0	0	318	541	198	1	149	0	0	0
Lane Group Flow (vph)	130	872	0	0	318	541	0	199	149	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	16.7	58.5	0.0	0.0	41.8	41.8	21.5	21.5	21.5	0.0	0.0	0.0
Total Split (%)	20.9%	73.1%	0.0%	0.0%	52.3%	52.3%	26.9%	26.9%	26.9%	0.0%	0.0%	0.0%
Maximum Green (s)	12.1	53.9			37.2	37.2	16.9	16.9	16.9			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	11.6	57.5			44.2	44.2		14.5	14.5			
Actuated g/C Ratio	0.14	0.72			0.55	0.55		0.18	0.18			
v/c Ratio	0.52	0.67			0.32	0.50		0.66	0.38			
Control Delay	30.1	4.8			12.9	3.0		41.1	8.0			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	30.1	4.8			12.9	3.0		41.1	8.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		D	A			
Approach Delay		8.1			6.7			26.9				
Approach LOS		A			A			C				
Queue Length 50th (ft)	54	48			90	0		93	0			
Queue Length 95th (ft)	m87	120			152	45		151	43			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	273	1302			1000	1092		363	441			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.48	0.67			0.32	0.50		0.55	0.34			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 15 (19%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 10.5 Intersection LOS: B
Intersection Capacity Utilization 56.7% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps

ø2	ø4		
21.5 s	58.5 s		
	ø8	ø7	
	41.8 s	16.7 s	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	Mitigated 2008 Project AM		

Project Description 04-837.1 Alt C

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	169	1	62	160	2
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	3	8	8	1	14	54
Percent Heavy Vehicles	11	--	--	19	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	8	8	1	13	50
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	67	173	2	16	183	1
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	16	67		69			19	
C (m) (veh/h)	1349	1295		707			535	
v/c	0.01	0.05		0.10			0.04	
95% queue length	0.04	0.16		0.32			0.11	
Control Delay (s/veh)	7.7	7.9		10.6			12.0	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	10.6			12.0		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 7/23/2006 2:24 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	Mitigated 2008 Project PM		

Project Description 04-837.1 Alt C

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	236	5	110	253	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	11	5	1	10	119
Percent Heavy Vehicles	13	--	--	15	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	11	5	1	10	110
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	119	274	1	15	256	5
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	15	119		130			17	
C (m) (veh/h)	1227	1232		683			339	
v/c	0.01	0.10		0.19			0.05	
95% queue length	0.04	0.32		0.70			0.16	
Control Delay (s/veh)	8.0	8.2		11.5			16.2	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	11.5			16.2		
Approach LOS	--	--	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 7/23/2006 2:25 PM

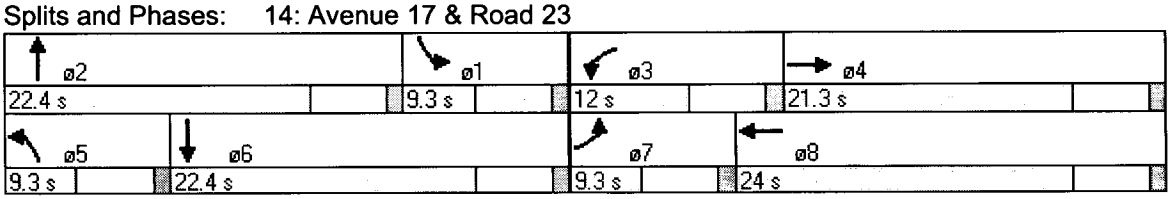
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.974			0.950			0.942			0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1814	0	1770	1770	0	1770	1755	0	1770	1859	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1814	0	1770	1770	0	1770	1755	0	1770	1859	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			10			49			1	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	2	44	9	109	18	9	5	167	107	24	127	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	48	10	118	20	10	5	182	116	26	138	2
Lane Group Flow (vph)	2	58	0	118	30	0	5	298	0	26	140	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	12.0	24.0	0.0	9.3	22.4	0.0	9.3	22.4	0.0
Total Split (%)	14.3%	32.8%	0.0%	18.5%	36.9%	0.0%	14.3%	34.5%	0.0%	14.3%	34.5%	0.0%
Maximum Green (s)	4.0	16.0		6.7	18.7		4.0	17.1		4.0	17.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.0	9.5		9.6	13.8		6.0	36.6		6.1	38.7	
Actuated g/C Ratio	0.08	0.13		0.15	0.21		0.08	0.57		0.09	0.60	
v/c Ratio	0.01	0.23		0.46	0.08		0.03	0.29		0.17	0.12	
Control Delay	25.0	19.0		24.9	12.2		25.2	10.1		25.5	9.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.0	19.0		24.9	12.2		25.2	10.1		25.5	9.0	
LOS	C	B		C	B		C	B		C	A	
Approach Delay		19.2			22.3			10.3			11.6	
Approach LOS		B			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	0	7		18	3		1	20		4	10	
Queue Length 95th (ft)	6	41		82	23		10	132		28	72	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	150	445		258	563		150	1024		154	1123	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.13		0.46	0.05		0.03	0.29		0.17	0.12	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 64
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 14.0 Intersection LOS: B
Intersection Capacity Utilization 39.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 14: Avenue 17 & Road 23



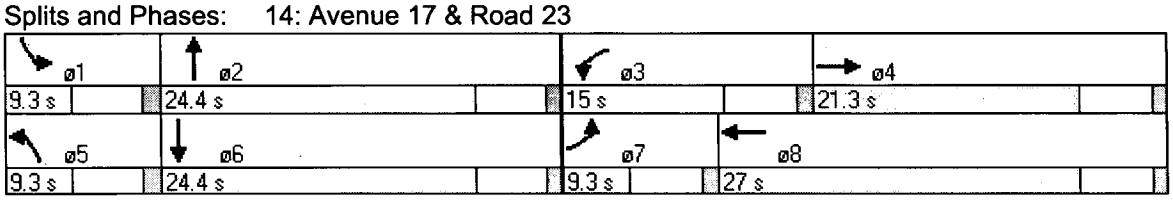
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.944			0.919			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1809	0	1770	1758	0	1770	1712	0	1770	1853	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1809	0	1770	1758	0	1770	1712	0	1770	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			33			85			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	8	84	20	205	51	30	6	193	226	38	196	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	91	22	223	55	33	7	210	246	41	213	7
Lane Group Flow (vph)	9	113	0	223	88	0	7	456	0	41	220	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	15.0	27.0	0.0	9.3	24.4	0.0	9.3	24.4	0.0
Total Split (%)	13.3%	30.4%	0.0%	21.4%	38.6%	0.0%	13.3%	34.9%	0.0%	13.3%	34.9%	0.0%
Maximum Green (s)	4.0	16.0		9.7	21.7		4.0	19.1		4.0	19.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	10.1		10.9	21.1		5.3	25.6		5.3	27.3	
Actuated g/C Ratio	0.08	0.16		0.18	0.35		0.08	0.43		0.08	0.46	
v/c Ratio	0.06	0.37		0.69	0.14		0.05	0.58		0.28	0.26	
Control Delay	30.2	22.1		36.7	10.1		30.0	18.0		33.3	13.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.2	22.1		36.7	10.1		30.0	18.0		33.3	13.8	
LOS	C	C		D	B		C	B		C	B	
Approach Delay		22.7			29.2			18.2			16.9	
Approach LOS		C			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	3	26		64	9		2	88		12	45	
Queue Length 95th (ft)	16	73		#189	46		14	#279		44	124	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	140	471		328	705		140	780		144	846	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.24		0.68	0.12		0.05	0.58		0.28	0.26	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 59.9
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 21.3 Intersection LOS: C
Intersection Capacity Utilization 55.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



Mitigated 2008 Project Alt C AM
15: Avenue 17 & Golden State Blvd 7/23/2006

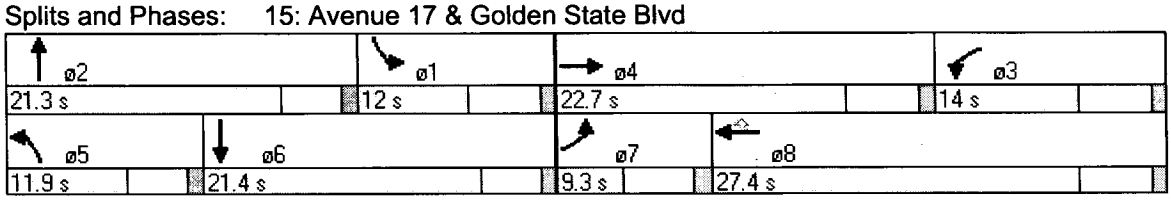
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.983				0.850		0.884			0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3479	0	1736	3471	1553	1492	1388	0	3433	1751	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3479	0	1736	3471	1553	1492	1388	0	3433	1751	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19				314		113			20	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	22	392	49	140	545	289	61	30	104	236	28	18
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	24	426	53	152	592	314	66	33	113	257	30	20
Lane Group Flow (vph)	24	479	0	152	592	314	66	146	0	257	50	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	22.7	0.0	14.0	27.4	27.4	11.9	21.3	0.0	12.0	21.4	0.0
Total Split (%)	13.3%	32.4%	0.0%	20.0%	39.1%	39.1%	17.0%	30.4%	0.0%	17.1%	30.6%	0.0%
Maximum Green (s)	4.0	17.4		8.7	22.1	22.1	7.3	16.7		6.7	16.8	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	18.7		10.0	29.0	29.0	7.3	17.3		8.0	22.2	
Actuated g/C Ratio	0.08	0.27		0.14	0.41	0.41	0.10	0.25		0.11	0.32	
v/c Ratio	0.18	0.51		0.61	0.41	0.38	0.42	0.34		0.66	0.09	
Control Delay	33.7	23.1		33.5	11.7	3.7	37.9	9.7		38.6	14.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	33.7	23.1		33.5	11.7	3.7	37.9	9.7		38.6	14.6	
LOS	C	C		C	B	A	D	A		D	B	
Approach Delay		23.6			12.5			18.5			34.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	10	87		46	18	0	27	11		55	10	
Queue Length 95th (ft)	31	131		#127	141	40	63	53		#93	34	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	134	943		248	1437	827	168	428		392	568	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.18	0.51		0.61	0.41	0.38	0.39	0.34		0.66	0.09	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 4 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 19.0 Intersection LOS: B
Intersection Capacity Utilization 48.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



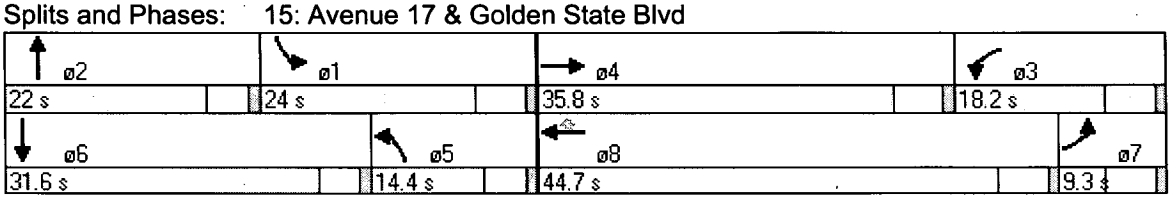
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.987				0.850		0.893			0.947	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3493	0	1656	3312	1482	1736	1631	0	3433	1764	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3493	0	1656	3312	1482	1736	1631	0	3433	1764	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				626		108			27	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	38	875	84	212	819	576	76	99	245	628	63	34
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	41	951	91	230	890	626	83	108	266	683	68	37
Lane Group Flow (vph)	41	1042	0	230	890	626	83	374	0	683	105	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	35.8	0.0	18.2	44.7	44.7	14.4	22.0	0.0	24.0	31.6	0.0
Total Split (%)	9.3%	35.8%	0.0%	18.2%	44.7%	44.7%	14.4%	22.0%	0.0%	24.0%	31.6%	0.0%
Maximum Green (s)	4.0	30.5		12.9	39.4	39.4	9.8	17.4		18.7	27.0	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead	Lead	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	31.8		14.2	44.4	44.4	9.6	18.0		20.0	30.5	
Actuated g/C Ratio	0.05	0.32		0.14	0.44	0.44	0.10	0.18		0.20	0.30	
v/c Ratio	0.44	0.93		0.98	0.61	0.62	0.50	0.98		0.99	0.19	
Control Delay	60.6	48.3		77.7	14.0	5.0	53.1	71.6		73.9	21.6	
Queue Delay	0.0	0.0		0.0	0.2	1.0	0.0	0.5		4.4	0.0	
Total Delay	60.6	48.3		77.7	14.1	6.0	53.1	72.2		78.4	21.6	
LOS	E	D		E	B	A	D	E		E	C	
Approach Delay		48.8			19.6			68.7			70.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			B			E			E	
Queue Length 50th (ft)	26	333		150	192	74	51	176		225	38	
Queue Length 95th (ft)	#61	#466		m#240	236	111	100	#366		#346	80	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	94	1118		235	1471	1006	181	382		687	556	
Starvation Cap Reductn	0	0		0	100	169	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	1		12	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.44	0.93		0.98	0.65	0.75	0.46	0.98		1.01	0.19	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 20 (20%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 42.8 Intersection LOS: D
Intersection Capacity Utilization 90.1% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.878			0.850			0.998			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1545	0	1671	1495	0	1770	3532	0	1770	3518	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1545	0	1671	1495	0	1770	3532	0	1770	3518	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			317			2			7	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	28	3	12	16	0	105	27	657	10	83	361	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	30	3	13	17	0	114	29	714	11	90	392	17
Lane Group Flow (vph)	30	16	0	17	114	0	29	725	0	90	409	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	8.9	20.9	0.0	8.9	20.9	0.0	8.9	21.2	0.0	9.0	21.3	0.0
Total Split (%)	14.8%	34.8%	0.0%	14.8%	34.8%	0.0%	14.8%	35.3%	0.0%	15.0%	35.5%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	16.3		4.1	16.4	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.2	10.4		5.8	7.8		5.8	35.3		6.1	40.2	
Actuated g/C Ratio	0.10	0.17		0.09	0.13		0.09	0.61		0.10	0.70	
v/c Ratio	0.18	0.06		0.11	0.24		0.18	0.33		0.51	0.17	
Control Delay	22.6	11.0		23.7	1.2		24.7	9.6		30.3	6.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.6	11.0		23.7	1.2		24.7	9.6		30.3	6.2	
LOS	C	B		C	A		C	A		C	A	
Approach Delay		18.5			4.2			10.2			10.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			A			B			B	
Queue Length 50th (ft)	6	1		3	0		6	57		18	14	
Queue Length 95th (ft)	27	14		19	0		28	138		#73	74	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	165	447		151	638		159	2197		177	2456	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.18	0.04		0.11	0.18		0.18	0.33		0.51	0.17	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 57.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 10.0 Intersection LOS: B
Intersection Capacity Utilization 41.3% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26

ø1	ø2	ø3	ø4
9 s	21.2 s	8.9 s	20.9 s

ø5	ø6	ø8	ø7
8.9 s	21.3 s	20.9 s	8.9 s

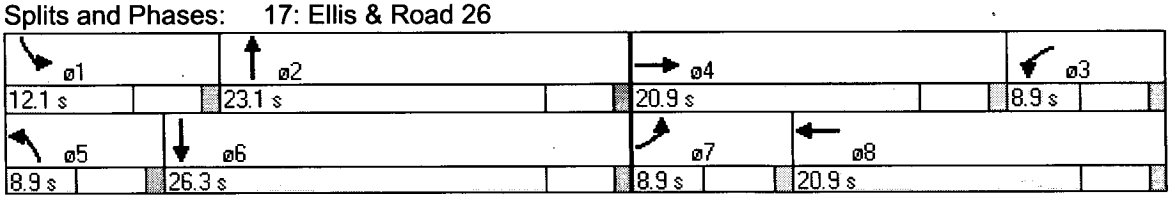
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.931			0.853			0.985			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1734	0	1770	1589	0	1770	3486	0	1770	3490	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1734	0	1770	1589	0	1770	3486	0	1770	3490	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			207			18			19	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	40	12	10	48	4	190	39	652	70	177	928	98
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	13	11	52	4	207	42	709	76	192	1009	107
Lane Group Flow (vph)	43	24	0	52	211	0	42	785	0	192	1116	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	8.9	20.9	0.0	8.9	20.9	0.0	8.9	23.1	0.0	12.1	26.3	0.0
Total Split (%)	13.7%	32.2%	0.0%	13.7%	32.2%	0.0%	13.7%	35.5%	0.0%	18.6%	40.5%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.2		7.2	21.4	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	4.9	7.3		8.2	8.2		4.9	20.1		8.3	30.4	
Actuated g/C Ratio	0.09	0.14		0.15	0.16		0.09	0.41		0.17	0.61	
v/c Ratio	0.27	0.10		0.20	0.50		0.26	0.55		0.65	0.52	
Control Delay	29.2	18.8		21.9	8.5		29.1	15.1		35.0	12.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.2	18.8		21.9	8.5		29.1	15.1		35.0	12.0	
LOS	C	B		C	A		C	B		C	B	
Approach Delay		25.5			11.2			15.8			15.3	
Approach LOS		C			B			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	10	3		12	1		10	75		43	51	
Queue Length 95th (ft)	42	22		44	48		41	184		#167	#304	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	159	480		263	599		159	1504		297	2144	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.27	0.05		0.20	0.35		0.26	0.52		0.65	0.52	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 49.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 60.7% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.958			0.984			0.951	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1757	0	1626	1640	0	1504	1558	0	1570	1571	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1757	0	1626	1640	0	1504	1558	0	1570	1571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			29			9			40	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	12	125	29	10	115	44	18	127	15	29	85	41
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	13	136	32	11	125	48	20	138	16	32	92	45
Lane Group Flow (vph)	13	168	0	11	173	0	20	154	0	32	137	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	24.4	0.0	10.0	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	37.5%	0.0%	15.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.1		4.7	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.5	11.9		5.5	11.9		5.5	30.2		6.3	32.4	
Actuated g/C Ratio	0.09	0.21		0.09	0.21		0.09	0.56		0.11	0.61	
v/c Ratio	0.08	0.43		0.07	0.46		0.15	0.17		0.19	0.14	
Control Delay	27.0	18.0		27.0	17.9		28.4	10.7		26.5	7.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.0	18.0		27.0	17.9		28.4	10.7		26.5	7.3	
LOS	C	B		C	B		C	B		C	A	
Approach Delay		18.7			18.4			12.7			11.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	3	26		2	25		4	13		6	9	
Queue Length 95th (ft)	20	95		18	95		26	86		35	65	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	156	539		148	512		137	883		166	967	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.31		0.07	0.34		0.15	0.17		0.19	0.14	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 53.5
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 30.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
10 s	24.4 s	9.3 s	21.3 s
ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.945			0.987			0.974	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1673	0	1736	1726	0	1703	1769	0	1556	1595	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1673	0	1736	1726	0	1703	1769	0	1556	1595	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			44			7			17	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	33	95	46	19	160	94	51	222	20	75	231	48
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	36	103	50	21	174	102	55	241	22	82	251	52
Lane Group Flow (vph)	36	153	0	21	276	0	55	263	0	82	303	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.4	0.0	11.0	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	36.0%	0.0%	16.9%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.1		5.7	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	14.6		5.4	13.0		5.4	24.3		7.1	25.2	
Actuated g/C Ratio	0.09	0.27		0.09	0.24		0.09	0.44		0.12	0.46	
v/c Ratio	0.24	0.32		0.14	0.62		0.35	0.33		0.44	0.41	
Control Delay	31.7	14.3		31.3	22.4		33.1	15.8		33.4	15.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.7	14.3		31.3	22.4		33.1	15.8		33.4	15.5	
LOS	C	B		C	C		C	B		C	B	
Approach Delay		17.6			23.0			18.8			19.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			B			B	
Queue Length 50th (ft)	10	28		6	60		16	55		23	60	
Queue Length 95th (ft)	39	80		27	147		53	147		#77	165	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	148	572		151	546		157	789		187	744	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.24	0.27		0.14	0.51		0.35	0.33		0.44	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 54.8
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 19.8 Intersection LOS: B
Intersection Capacity Utilization 49.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
11 s	23.4 s	9.3 s	21.3 s
ø5	**ø6**	**ø7**	**ø8**
9.3 s	25.1 s	9.3 s	21.3 s

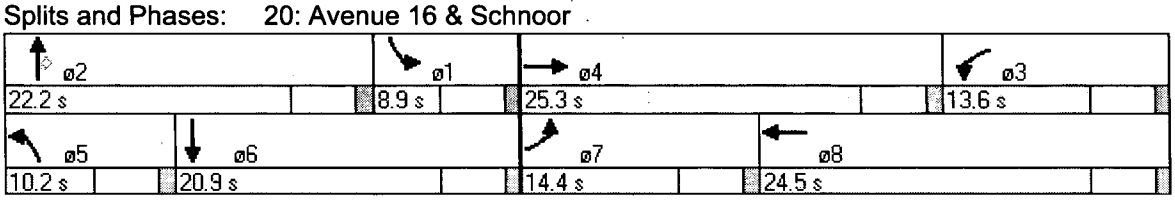
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.901			0.973				0.850		0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1678	0	3400	1795	0	1770	1863	1583	1327	1273	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1678	0	3400	1795	0	1770	1863	1583	1327	1273	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			11				97		29	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		334			571			552			643	
Travel Time (s)		5.7			9.7			9.4			11.0	
Volume (vph)	258	23	45	216	45	10	46	8	89	4	18	27
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
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	36%	36%	36%
Adj. Flow (vph)	280	25	49	235	49	11	50	9	97	4	20	29
Lane Group Flow (vph)	280	74	0	235	60	0	50	9	97	4	49	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9	20.9	8.9	20.9	
Total Split (s)	14.4	25.3	0.0	13.6	24.5	0.0	10.2	22.2	22.2	8.9	20.9	0.0
Total Split (%)	20.6%	36.1%	0.0%	19.4%	35.0%	0.0%	14.6%	31.7%	31.7%	12.7%	29.9%	0.0%
Maximum Green (s)	9.5	20.4		8.7	19.6		5.3	17.3	17.3	4.0	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	12.0	34.2		9.6	31.8		6.2	11.9	11.9	6.7	8.1	
Actuated g/C Ratio	0.17	0.49		0.14	0.45		0.09	0.17	0.17	0.10	0.12	
v/c Ratio	0.47	0.09		0.50	0.07		0.32	0.03	0.28	0.03	0.28	
Control Delay	28.4	6.8		19.5	4.7		35.8	23.1	8.5	29.0	19.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	28.4	6.8		19.5	4.7		35.8	23.1	8.5	29.0	19.6	
LOS	C	A		B	A		D	C	A	C	B	
Approach Delay		23.9			16.5			18.1			20.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	56	6		44	4		21	3	0	2	8	
Queue Length 95th (ft)	85	30		63	m17		52	15	38	10	35	
Internal Link Dist (ft)		254			491			472			563	
Turn Bay Length (ft)												
Base Capacity (vph)	605	845		466	821		157	488	486	126	329	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.46	0.09		0.50	0.07		0.32	0.02	0.20	0.03	0.15	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 55 (79%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 20.1 Intersection LOS: C
Intersection Capacity Utilization 29.9% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Avenue 16 & Schnoor



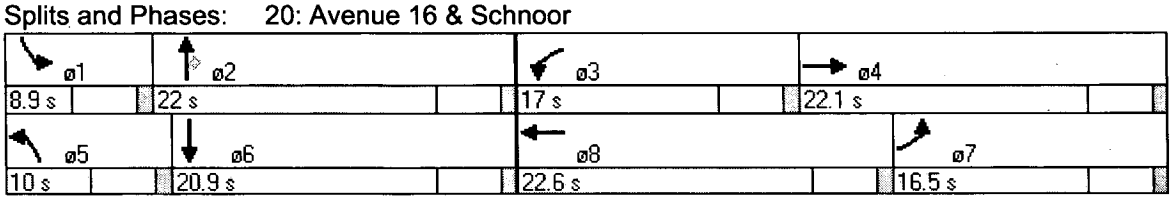
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.891			0.966				0.850		0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1660	0	3433	1799	0	1597	1681	1429	1770	1699	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1660	0	3433	1799	0	1597	1681	1429	1770	1699	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		123			21				236		41	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		334			571			552			643	
Travel Time (s)		5.7			9.7			9.4			11.0	
Volume (vph)	323	43	113	520	84	25	86	15	217	8	27	38
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	351	47	123	565	91	27	93	16	236	9	29	41
Lane Group Flow (vph)	351	170	0	565	118	0	93	16	236	9	70	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9	20.9	8.9	20.9	
Total Split (s)	16.5	22.1	0.0	17.0	22.6	0.0	10.0	22.0	22.0	8.9	20.9	0.0
Total Split (%)	23.6%	31.6%	0.0%	24.3%	32.3%	0.0%	14.3%	31.4%	31.4%	12.7%	29.9%	0.0%
Maximum Green (s)	11.6	17.2		12.1	17.7		5.1	17.1	17.1	4.0	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	12.5	22.4		19.2	29.1		6.0	14.6	14.6	4.9	8.4	
Actuated g/C Ratio	0.18	0.32		0.27	0.42		0.09	0.21	0.21	0.07	0.12	
v/c Ratio	0.57	0.28		0.60	0.16		0.68	0.05	0.49	0.07	0.29	
Control Delay	30.5	8.8		12.5	4.9		58.1	21.6	7.5	31.9	17.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	30.5	8.8		12.5	4.9		58.1	21.6	7.5	31.9	17.4	
LOS	C	A		B	A		E	C	A	C	B	
Approach Delay		23.4			11.2			21.8			19.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			C			B	
Queue Length 50th (ft)	72	15		43	9		40	5	0	4	12	
Queue Length 95th (ft)	111	60		75	m21		#108	20	53	17	42	
Internal Link Dist (ft)		254			491			472			563	
Turn Bay Length (ft)												
Base Capacity (vph)	613	615		944	761		137	435	545	124	441	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.57	0.28		0.60	0.16		0.68	0.04	0.43	0.07	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 66 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 17.7 Intersection LOS: B
Intersection Capacity Utilization 45.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Avenue 16 & Schnoor



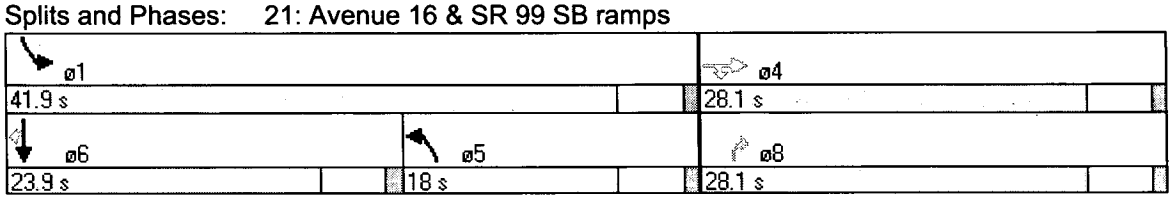
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1845	1568	0	0	0	3072	0	1417	1703	1792	1524
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1845	1568	0	0	0	3072	0	1417	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			413						7	2		220
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		571			228			1041			580	
Travel Time (s)		9.7			5.2			17.7			13.2	
Volume (vph)	0	130	380	0	0	0	239	0	6	2	110	202
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
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	14%	14%	14%	6%	6%	6%
Adj. Flow (vph)	0	141	413	0	0	0	260	0	7	2	120	220
Lane Group Flow (vph)	0	141	413	0	0	0	260	0	7	2	120	220
Turn Type			custom				Prot		custom	Prot		Perm
Protected Phases							5			1	6	
Permitted Phases		4	4						8			6
Detector Phases		4	4				5		8	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				8.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	28.1	28.1	0.0	0.0	0.0	18.0	0.0	28.1	41.9	23.9	23.9
Total Split (%)	0.0%	40.1%	40.1%	0.0%	0.0%	0.0%	25.7%	0.0%	40.1%	59.9%	34.1%	34.1%
Maximum Green (s)		23.2	23.2				13.1		23.2	37.0	19.0	19.0
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		C-Max	C-Max				None		C-Max	None	None	None
Walk Time (s)		5.0	5.0						5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0						11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0						0		0	0
Act Effct Green (s)		36.4	36.4				11.0		36.4	12.5	10.6	10.6
Actuated g/C Ratio		0.52	0.52				0.16		0.52	0.18	0.15	0.15
v/c Ratio		0.15	0.41				0.54		0.01	0.01	0.44	0.53
Control Delay		11.1	2.9				23.0		8.5	10.5	31.5	9.0
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		11.1	2.9				23.0		8.5	10.5	31.5	9.0
LOS		B	A				C		A	B	C	A
Approach Delay		5.0									16.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A									B	
Queue Length 50th (ft)		28	0				31		1	0	48	0
Queue Length 95th (ft)		73	41				46		m7	3	88	52
Internal Link Dist (ft)		491			148			961			500	
Turn Bay Length (ft)												
Base Capacity (vph)		961	1014				653		741	923	509	591
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.15	0.41				0.40		0.01	0.00	0.24	0.37

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 5 (7%), Referenced to phase 4:EBT and 8:NBR, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 12.5 Intersection LOS: B
Intersection Capacity Utilization 36.0% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps



Mitigated 2008 Project Alt C PM
21: Avenue 16 & SR 99 SB ramps 7/23/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)		50	50				50		50	50	50	50
Trailing Detector (ft)		0	0				0		0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	1863	1583	0	0	0	3433	0	1583	1736	1827	1553
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	0	0	3433	0	1583	1736	1827	1553
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			696						11	3		516
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			30			40			30	
Link Distance (ft)		571			228			1041			580	
Travel Time (s)		9.7			5.2			17.7			13.2	
Volume (vph)	0	285	679	0	0	0	524	0	10	3	198	475
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	310	738	0	0	0	570	0	11	3	215	516
Lane Group Flow (vph)	0	310	738	0	0	0	570	0	11	3	215	516
Turn Type			custom				Prot		custom	Prot		Perm
Protected Phases							5			1	6	
Permitted Phases		4	4						8			6
Detector Phases		4	4				5		8	1	6	6
Minimum Initial (s)		4.0	4.0				4.0		4.0	4.0	4.0	4.0
Minimum Split (s)		20.9	20.9				8.9		20.9	8.9	20.9	20.9
Total Split (s)	0.0	29.0	29.0	0.0	0.0	0.0	19.0	0.0	29.0	41.0	22.0	22.0
Total Split (%)	0.0%	41.4%	41.4%	0.0%	0.0%	0.0%	27.1%	0.0%	41.4%	58.6%	31.4%	31.4%
Maximum Green (s)		24.1	24.1				14.1		24.1	36.1	17.1	17.1
Yellow Time (s)		3.9	3.9				3.9		3.9	3.9	3.9	3.9
All-Red Time (s)		1.0	1.0				1.0		1.0	1.0	1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)		3.0	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode		C-Max	C-Max				None		C-Max	None	None	None
Walk Time (s)		5.0	5.0						5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0						11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0						0		0	0
Act Effct Green (s)		27.9	27.9				15.8		27.9	12.5	14.4	14.4
Actuated g/C Ratio		0.40	0.40				0.23		0.40	0.18	0.21	0.21
v/c Ratio		0.42	0.70				0.74		0.02	0.01	0.57	0.71
Control Delay		18.7	6.7				22.5		11.0	10.3	30.6	8.4
Queue Delay		0.0	0.0				0.0		0.0	0.0	0.0	0.0
Total Delay		18.7	6.7				22.5		11.0	10.3	30.6	8.4
LOS		B	A				C		B	B	C	A
Approach Delay		10.2									14.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B									B	
Queue Length 50th (ft)		100	11				96		2	0	83	0
Queue Length 95th (ft)		172	120				#146		m4	3	138	72
Internal Link Dist (ft)		491			148			961			500	
Turn Bay Length (ft)												
Base Capacity (vph)		742	1049				780		637	919	470	783
Starvation Cap Reductn		0	0				0		0	0	0	0
Spillback Cap Reductn		0	0				0		0	0	0	0
Storage Cap Reductn		0	0				0		0	0	0	0
Reduced v/c Ratio		0.42	0.70				0.73		0.02	0.00	0.46	0.66

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 56 (80%), Referenced to phase 4:EBT and 8:NBR, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 14.6 Intersection LOS: B
Intersection Capacity Utilization 59.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Avenue 16 & SR 99 SB ramps

ø1	ø4
41 s	29 s

ø6	ø5	ø8
22 s	19 s	29 s

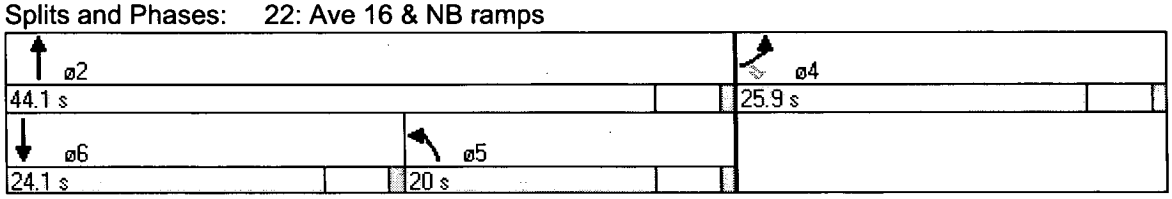
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.871	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3367	1553	1656	1743	1547	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3367	1553	1656	1743	1547	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		229			145	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1041			475	543	
Travel Time (s)	23.7			10.8	12.3	
Volume (vph)	279	211	112	143	6	133
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	9%	9%	7%	7%
Adj. Flow (vph)	303	229	122	155	7	145
Lane Group Flow (vph)	303	229	122	155	152	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Detector Phases	4	4	5	2	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.9	20.9	8.9	20.9	20.9	
Total Split (s)	25.9	25.9	20.0	44.1	24.1	0.0
Total Split (%)	37.0%	37.0%	28.6%	63.0%	34.4%	0.0%
Maximum Green (s)	21.0	21.0	15.1	39.2	19.2	
Yellow Time (s)	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Min	C-Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	12.5	12.5	11.0	49.5	36.6	
Actuated g/C Ratio	0.18	0.18	0.16	0.71	0.52	
v/c Ratio	0.50	0.49	0.47	0.13	0.17	
Control Delay	26.7	6.3	31.8	4.3	3.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.7	6.3	31.8	4.3	3.8	
LOS	C	A	C	A	A	
Approach Delay	17.9			16.4	3.8	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			B	A	
Queue Length 50th (ft)	54	5	48	14	1	
Queue Length 95th (ft)	86	36	89	41	35	
Internal Link Dist (ft)	961			395	463	
Turn Bay Length (ft)						
Base Capacity (vph)	1053	643	379	1233	878	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.29	0.36	0.32	0.13	0.17	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 24 (34%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 15.2 Intersection LOS: B
Intersection Capacity Utilization 32.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 22: Ave 16 & NB ramps



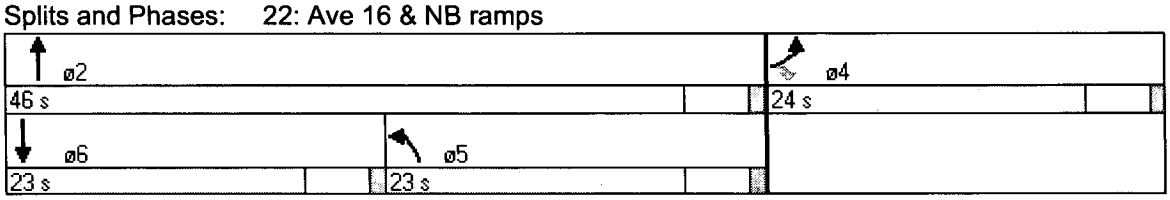
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.869	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3347	1534	1643	1729	1531	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3347	1534	1643	1729	1531	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		466			325	
Headway Factor	1.01	1.02	1.01	1.01	1.01	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	1041			475	543	
Travel Time (s)	23.7			10.8	12.3	
Volume (vph)	448	429	235	221	10	299
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	9%	9%	7%	7%
Bus Blockages (#/hr)	3	3	2	2	2	2
Adj. Flow (vph)	487	466	255	240	11	325
Lane Group Flow (vph)	487	466	255	240	336	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Detector Phases	4	4	5	2	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.9	20.9	8.9	20.9	20.9	
Total Split (s)	24.0	24.0	23.0	46.0	23.0	0.0
Total Split (%)	34.3%	34.3%	32.9%	65.7%	32.9%	0.0%
Maximum Green (s)	19.1	19.1	18.1	41.1	18.1	
Yellow Time (s)	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Min	C-Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	17.5	17.5	16.4	44.5	24.1	
Actuated g/C Ratio	0.25	0.25	0.23	0.64	0.34	
v/c Ratio	0.58	0.64	0.66	0.22	0.45	
Control Delay	23.3	5.8	32.1	6.9	5.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.3	5.8	32.1	6.9	5.7	
LOS	C	A	C	A	A	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	14.8			19.9	5.7	
Approach LOS	B			B	A	
Queue Length 50th (ft)	63	0	100	50	4	
Queue Length 95th (ft)	148	124	153	75	65	
Internal Link Dist (ft)	961			395	463	
Turn Bay Length (ft)						
Base Capacity (vph)	995	784	462	1120	757	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.49	0.59	0.55	0.21	0.44	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 54.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 22: Ave 16 & NB ramps



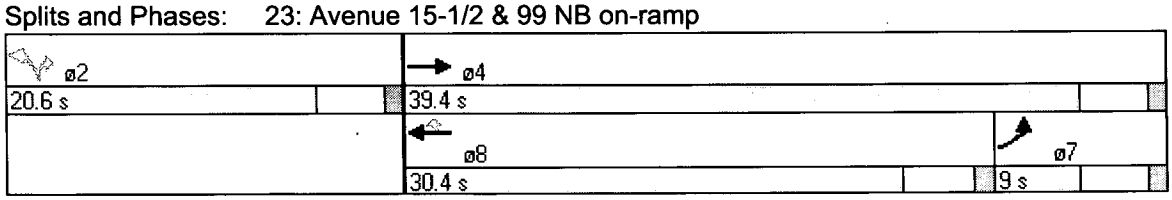
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						199			194			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	123	715	0	0	1025	183	344	0	184	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	134	777	0	0	1114	199	374	0	200	0	0	0
Lane Group Flow (vph)	134	777	0	0	1114	199	374	0	200	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	9.0	39.4	0.0	0.0	30.4	30.4	20.6	0.0	20.6	0.0	0.0	0.0
Total Split (%)	15.0%	65.7%	0.0%	0.0%	50.7%	50.7%	34.3%	0.0%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	4.4	34.8			25.8	25.8	16.0		16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	5.0	39.3			32.1	32.1	12.7		12.7			
Actuated g/C Ratio	0.08	0.66			0.54	0.54	0.21		0.21			
v/c Ratio	0.47	0.34			0.60	0.22	0.54		0.43			
Control Delay	31.6	2.2			12.7	2.5	23.6		6.7			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	31.6	2.2			12.7	2.5	23.6		6.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A	C		A			
Approach Delay		6.6			11.1							
Approach LOS		A			B							
Queue Length 50th (ft)	28	33			140	0	62		2			
Queue Length 95th (ft)	54	45			233	30	90		43			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	286	2317			1856	923	897		554			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.47	0.34			0.60	0.22	0.42		0.36			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 1 (2%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 11.0 Intersection LOS: B
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						385			22			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	242	1786	0	0	1679	354	699	0	311	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	263	1941	0	0	1825	385	760	0	338	0	0	0
Lane Group Flow (vph)	263	1941	0	0	1825	385	760	0	338	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	12.0	64.9	0.0	0.0	52.9	52.9	25.1	0.0	25.1	0.0	0.0	0.0
Total Split (%)	13.3%	72.1%	0.0%	0.0%	58.8%	58.8%	27.9%	0.0%	27.9%	0.0%	0.0%	0.0%
Maximum Green (s)	7.4	60.3			48.3	48.3	20.5		20.5			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	8.0	60.9			48.9	48.9	21.1		21.1			
Actuated g/C Ratio	0.09	0.68			0.54	0.54	0.23		0.23			
v/c Ratio	0.86	0.81			0.95	0.37	0.95		0.88			
Control Delay	65.4	3.9			31.9	2.3	57.6		56.7			
Queue Delay	0.0	0.7			0.8	0.0	0.0		0.0			
Total Delay	65.4	4.7			32.8	2.3	57.6		56.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			C	A	E		E			
Approach Delay		11.9			27.5							
Approach LOS		B			C							
Queue Length 50th (ft)	84	128			484	0	220		175			
Queue Length 95th (ft)	m#100	131			#679	39	#335		#331			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	305	2395			1923	1036	797		384			
Starvation Cap Reductn	0	184			0	0	0		0			
Spillback Cap Reductn	0	0			21	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.86	0.88			0.96	0.37	0.95		0.88			

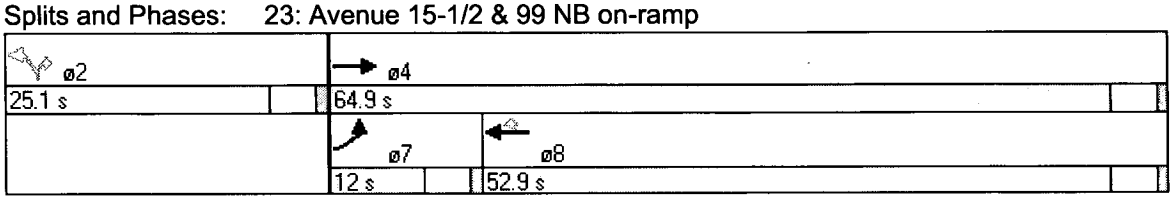
Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 10 (11%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 123.2% ICU Level of Service H
Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



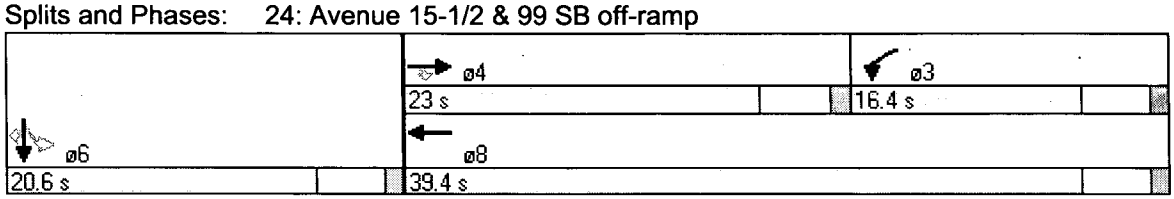
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			385									93
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	670	354	361	1008	0	0	0	0	173	1	87
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	728	385	392	1096	0	0	0	0	188	1	95
Lane Group Flow (vph)	0	728	385	392	1096	0	0	0	0	94	95	95
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	23.0	23.0	16.4	39.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	38.3%	38.3%	27.3%	65.7%	0.0%	0.0%	0.0%	0.0%	34.3%	34.3%	34.3%
Maximum Green (s)		18.4	18.4	11.8	34.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		26.5	26.5	12.4	42.9					9.1	9.1	9.1
Actuated g/C Ratio		0.44	0.44	0.21	0.72					0.15	0.15	0.15
v/c Ratio		0.47	0.42	0.56	0.44					0.37	0.37	0.30
Control Delay		13.6	3.2	18.7	1.5					26.2	26.2	8.5
Queue Delay		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Total Delay		13.6	3.2	18.7	1.5					26.2	26.2	8.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B	A	B	A					C	C	A
Approach Delay		10.0			6.0						20.3	
Approach LOS		A			A						C	
Queue Length 50th (ft)		92	0	71	0					32	32	1
Queue Length 95th (ft)		148	45	89	22					67	68	32
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1561	913	696	2480					465	466	505
Starvation Cap Reductn		0	0	0	0					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.47	0.42	0.56	0.44					0.20	0.20	0.19

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 8.9 Intersection LOS: A
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



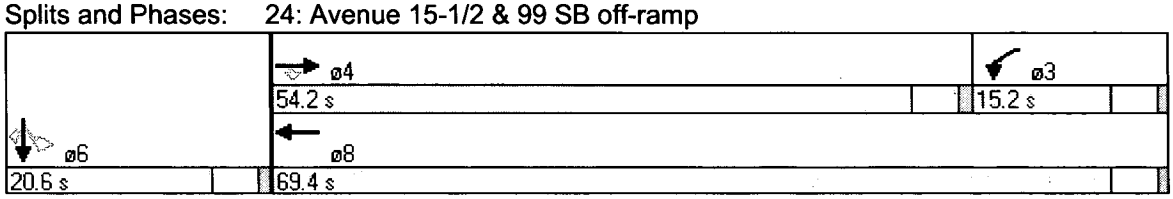
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			625									15
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1601	575	296	2082	0	0	0	0	413	1	203
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1740	625	322	2263	0	0	0	0	449	1	221
Lane Group Flow (vph)	0	1740	625	322	2263	0	0	0	0	225	225	221
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	54.2	54.2	15.2	69.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	60.2%	60.2%	16.9%	77.1%	0.0%	0.0%	0.0%	0.0%	22.9%	22.9%	22.9%
Maximum Green (s)		49.6	49.6	10.6	64.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		51.4	51.4	11.2	66.6					15.4	15.4	15.4
Actuated g/C Ratio		0.57	0.57	0.12	0.74					0.17	0.17	0.17
v/c Ratio		0.86	0.53	0.75	0.86					0.78	0.78	0.78
Control Delay		22.4	2.7	38.5	7.6					55.2	55.0	52.9
Queue Delay		0.1	0.0	0.0	1.6					0.0	0.0	0.0
Total Delay		22.5	2.7	38.5	9.3					55.2	55.0	52.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	D	A					E	E	D
Approach Delay		17.3			12.9						54.4	
Approach LOS		B			B						D	
Queue Length 50th (ft)		422	0	91	227					128	128	111
Queue Length 95th (ft)		541	45	m94	m247					#236	#235	#215
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		2021	1172	427	2619					310	311	304
Starvation Cap Reductn		0	0	0	199					0	0	0
Spillback Cap Reductn		10	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.87	0.53	0.75	0.94					0.73	0.72	0.73

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 123.2% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
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
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						46						482
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	377	0	42	379	502	0	0	165	443
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	410	0	46	412	546	0	0	179	482
Lane Group Flow (vph)	0	0	0	410	0	46	412	546	0	0	179	482
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	16.0	39.4	0.0	0.0	23.4	23.4
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	26.7%	65.7%	0.0%	0.0%	39.0%	39.0%
Maximum Green (s)				16.0		16.0	11.4	34.8			18.8	18.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				12.7		12.7	12.2	39.3			23.1	23.1
Actuated g/C Ratio				0.21		0.21	0.20	0.66			0.38	0.38
v/c Ratio				0.56		0.12	0.59	0.45			0.25	0.53
Control Delay				23.9		7.1	22.9	6.0			15.2	4.3
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				23.9		7.1	22.9	6.0			15.2	4.3
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								13.3			7.3	
Approach LOS								B			A	
Queue Length 50th (ft)				69		0	75	90			44	0
Queue Length 95th (ft)				97		20	100	162			91	56
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				950		471	730	1220			717	906
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.43		0.10	0.56	0.45			0.25	0.53

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 33 (55%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 13.3 Intersection LOS: B
Intersection Capacity Utilization 44.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave

Mitigated 2008 Project Alt C PM
25: 99 NB on-ramp & SR 145 / Madera Ave 7/23/2006

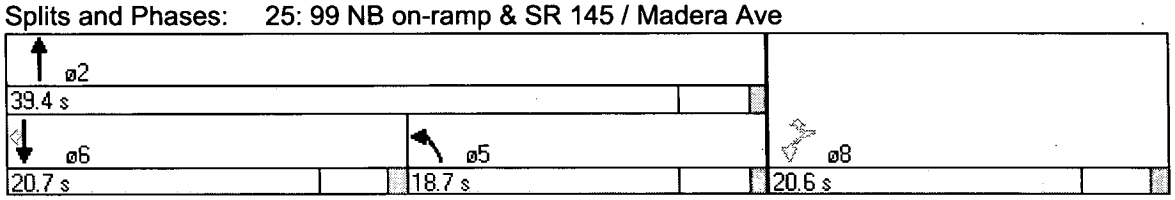
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						41						486
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	250	0	38	612	685	0	0	260	447
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	272	0	41	665	745	0	0	283	486
Lane Group Flow (vph)	0	0	0	272	0	41	665	745	0	0	283	486
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	18.7	39.4	0.0	0.0	20.7	20.7
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	31.2%	65.7%	0.0%	0.0%	34.5%	34.5%
Maximum Green (s)				16.0		16.0	14.1	34.8			16.1	16.1
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				10.3		10.3	15.1	41.7			22.6	22.6
Actuated g/C Ratio				0.17		0.17	0.25	0.70			0.38	0.38
v/c Ratio				0.46		0.13	0.77	0.58			0.40	0.54
Control Delay				24.6		8.6	22.6	4.7			16.6	4.3
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				24.6		8.6	22.6	4.7			16.6	4.3
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								13.1			8.8	
Approach LOS								B			A	
Queue Length 50th (ft)				46		0	101	75			75	0
Queue Length 95th (ft)				73		21	m126	m97			137	55
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				950		468	882	1295			702	899
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.29		0.09	0.75	0.58			0.40	0.54

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 2 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 51.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



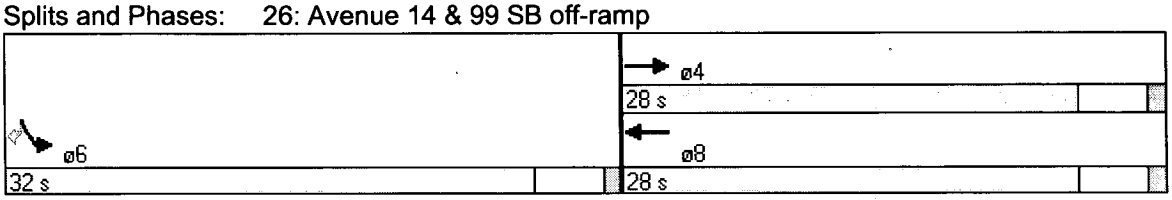
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						249
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	433	417	0	499	302
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	471	453	0	542	328
Lane Group Flow (vph)	0	471	453	0	542	328
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	28.0	28.0	0.0	32.0	32.0
Total Split (%)	0.0%	46.7%	46.7%	0.0%	53.3%	53.3%
Maximum Green (s)		23.4	23.4		27.4	27.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		28.7	28.7		23.3	23.3
Actuated g/C Ratio		0.48	0.48		0.39	0.39
v/c Ratio		0.53	0.51		0.80	0.43
Control Delay		15.2	8.4		25.1	4.9
Queue Delay		0.0	1.2		0.0	0.0
Total Delay		15.2	9.5		25.1	4.9
LOS		B	A		C	A
Approach Delay		15.2	9.5		17.5	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		B	
Queue Length 50th (ft)		117	40		160	17
Queue Length 95th (ft)		220	93		240	55
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		891	891		818	865
Starvation Cap Reductn		0	232		0	0
Spillback Cap Reductn		9	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.53	0.69		0.66	0.38

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 14.9 Intersection LOS: B
Intersection Capacity Utilization 57.1% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



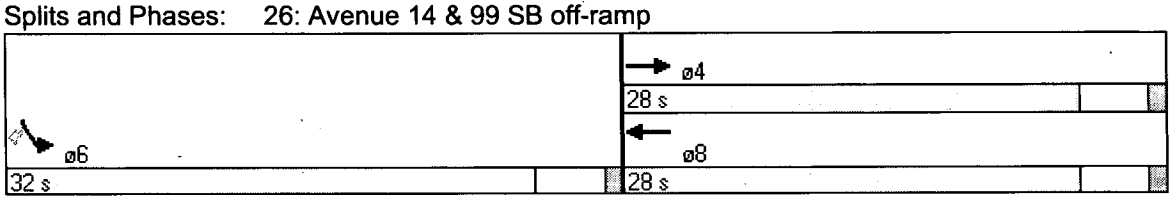
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						204
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	563	314	0	662	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	612	341	0	720	204
Lane Group Flow (vph)	0	612	341	0	720	204
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	28.0	28.0	0.0	32.0	32.0
Total Split (%)	0.0%	46.7%	46.7%	0.0%	53.3%	53.3%
Maximum Green (s)		23.4	23.4		27.4	27.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		25.2	25.2		26.8	26.8
Actuated g/C Ratio		0.42	0.42		0.45	0.45
v/c Ratio		0.78	0.44		0.91	0.25
Control Delay		25.1	6.7		33.8	2.6
Queue Delay		1.0	1.4		0.5	0.0
Total Delay		26.1	8.2		34.3	2.6
LOS		C	A		C	A
Approach Delay		26.1	8.2		27.3	
Approach LOS		C	A		C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		190	46		219	0
Queue Length 95th (ft)		#359	81		#423	28
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		783	783		826	848
Starvation Cap Reductn		0	262		0	0
Spillback Cap Reductn		45	0		12	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.83	0.65		0.88	0.24

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 8 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 23.4 Intersection LOS: C
Intersection Capacity Utilization 73.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



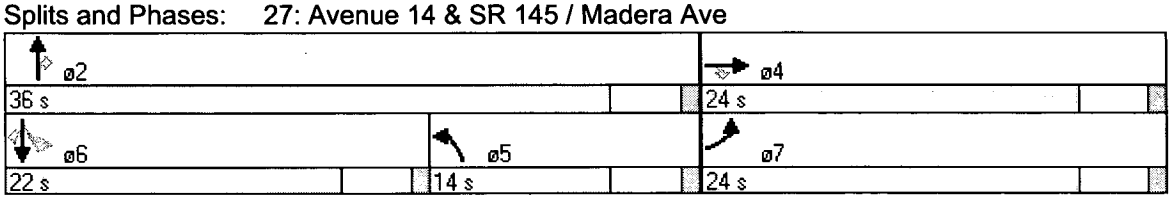
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.998	
Satd. Flow (prot)	3335	1810	1538	0	0	0	1752	1845	1568	0	3498	1568
Flt Permitted	0.950						0.950				0.843	
Satd. Flow (perm)	3335	1810	1538	0	0	0	1752	1845	1568	0	2955	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			583						21			285
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	267	114	551	0	0	0	155	615	19	11	269	262
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	290	124	599	0	0	0	168	668	21	12	292	285
Lane Group Flow (vph)	290	124	599	0	0	0	168	668	21	0	304	285
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	24.0	24.0	24.0	0.0	0.0	0.0	14.0	36.0	36.0	22.0	22.0	22.0
Total Split (%)	40.0%	40.0%	40.0%	0.0%	0.0%	0.0%	23.3%	60.0%	60.0%	36.7%	36.7%	36.7%
Maximum Green (s)	19.4	19.4	19.4				9.4	31.4	31.4	17.4	17.4	17.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	12.8	12.8	12.8				9.6	39.2	39.2		27.7	27.7
Actuated g/C Ratio	0.21	0.21	0.21				0.16	0.65	0.65		0.46	0.46
v/c Ratio	0.41	0.32	0.76				0.60	0.55	0.02		0.22	0.32
Control Delay	22.6	21.4	9.4				32.9	9.4	3.2		4.8	2.6
Queue Delay	0.2	0.3	0.7				0.0	0.0	0.0		0.0	0.2
Total Delay	22.8	21.7	10.1				32.9	9.4	3.2		4.8	2.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	B				C	A	A		A	A
Approach Delay		15.2						13.8			3.8	
Approach LOS		B						B			A	
Queue Length 50th (ft)	52	43	29				55	83	0		16	0
Queue Length 95th (ft)	m58	m53	m63				#114	267	8		35	12
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1112	603	901				302	1205	1031		1363	877
Starvation Cap Reductn	299	179	89				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	145
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.36	0.29	0.74				0.56	0.55	0.02		0.22	0.39

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 12.0 Intersection LOS: B
Intersection Capacity Utilization 57.7% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



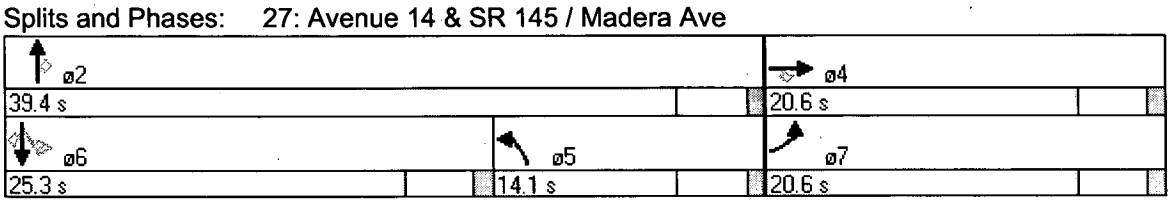
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.997	
Satd. Flow (prot)	3367	1827	1553	0	0	0	1770	1863	1583	0	3529	1583
Flt Permitted	0.950						0.950				0.682	
Satd. Flow (perm)	3367	1827	1553	0	0	0	1770	1863	1583	0	2414	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			574						17			208
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	319	187	719	0	0	0	123	978	16	19	296	191
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	347	203	782	0	0	0	134	1063	17	21	322	208
Lane Group Flow (vph)	347	203	782	0	0	0	134	1063	17	0	343	208
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	20.6	20.6	20.6	0.0	0.0	0.0	14.1	39.4	39.4	25.3	25.3	25.3
Total Split (%)	34.3%	34.3%	34.3%	0.0%	0.0%	0.0%	23.5%	65.7%	65.7%	42.2%	42.2%	42.2%
Maximum Green (s)	16.0	16.0	16.0				9.5	34.8	34.8	20.7	20.7	20.7
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	15.3	15.3	15.3				10.7	36.7	36.7		24.0	24.0
Actuated g/C Ratio	0.26	0.26	0.26				0.18	0.61	0.61		0.40	0.40
v/c Ratio	0.40	0.44	0.95				0.42	0.93	0.02		0.35	0.27
Control Delay	19.6	20.5	22.2				26.6	28.9	2.8		7.5	3.3
Queue Delay	3.9	12.9	37.6				0.0	0.0	0.0		0.0	0.1
Total Delay	23.6	33.4	59.8				26.6	28.9	2.8		7.5	3.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	E				C	C	A		A	A
Approach Delay		46.4						28.3			6.0	
Approach LOS		D						C			A	
Queue Length 50th (ft)	53	61	76				44	320	0		38	0
Queue Length 95th (ft)	m65	m75	m#216				90	#608	6		62	27
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	932	505	845				339	1139	975		1023	790
Starvation Cap Reductn	490	274	121				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	87
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.79	0.88	1.08				0.40	0.93	0.02		0.34	0.30

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 32.1 Intersection LOS: C
Intersection Capacity Utilization 80.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



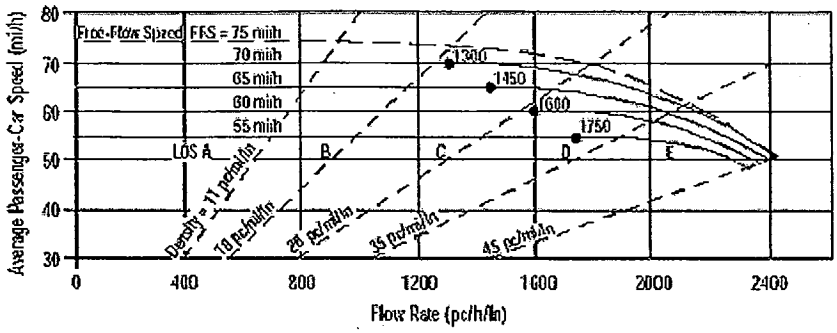
ATTACHMENT VI – C - 23

2030 NO PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4245*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

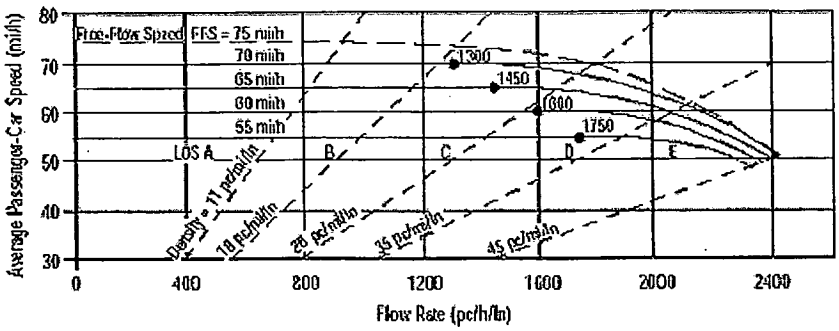
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1729*	pc/h/ln	Design LOS	
S	*68.6*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*25.2*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☒ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4364*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

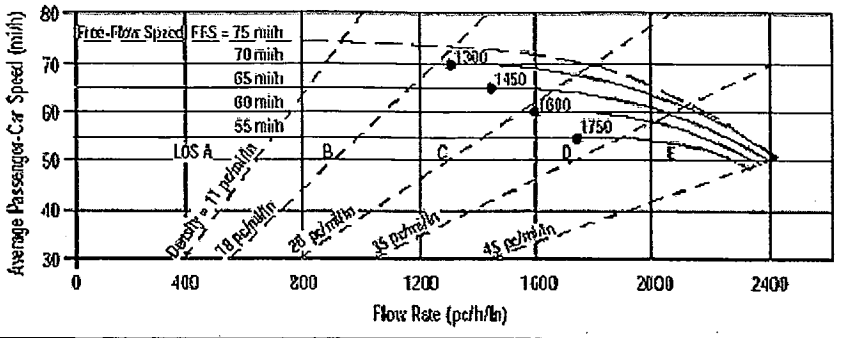
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1777*	pc/h/ln	Design LOS		
S	*68.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*26.1*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3490*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1421*	pc/h/ln	Design LOS	
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*20.3*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary

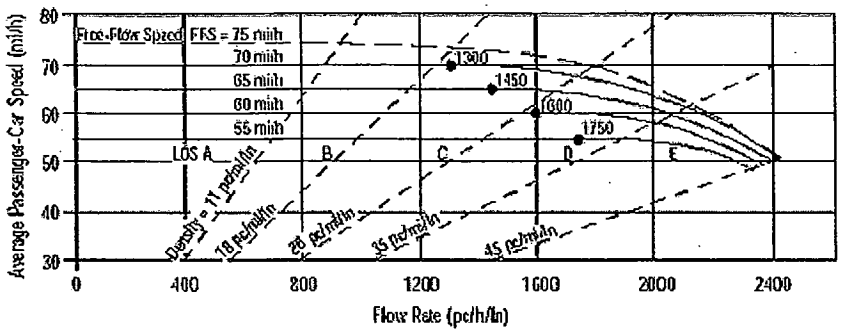
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*5295*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

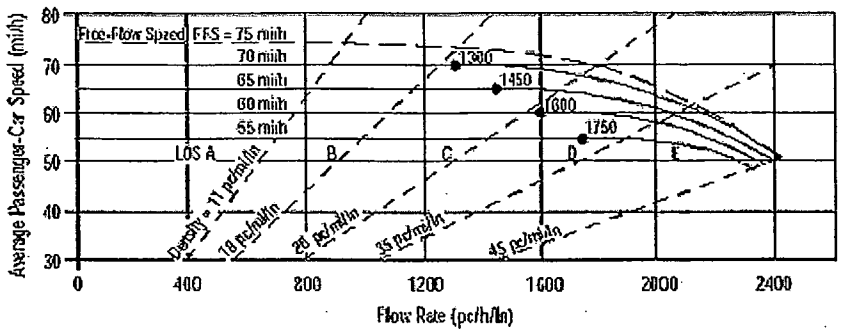
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2156*	pc/h/ln	Design LOS	
S	*61.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*35.2*	pc/mi/ln	S	mi/h
LOS	*E*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4635*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

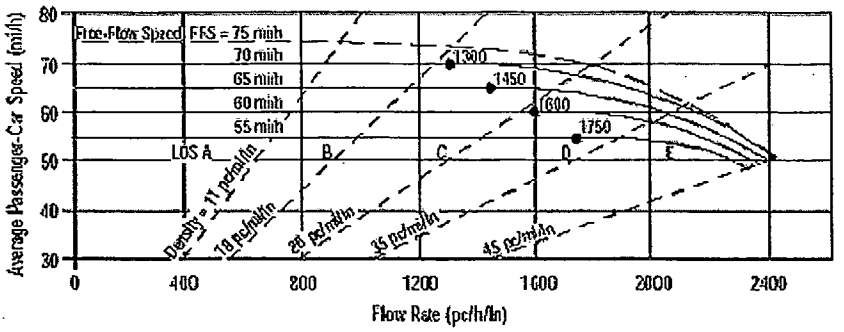
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1888*	pc/h/ln	Design LOS		
S	*66.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*28.3*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4699*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

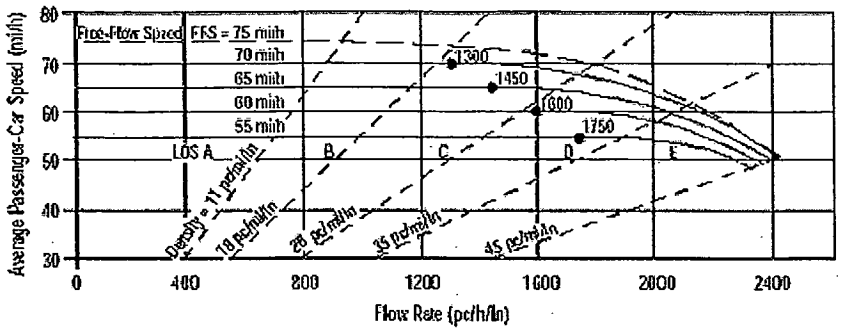
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1914*	pc/h/ln	Design LOS		
S	*66.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*28.9*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*3793*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

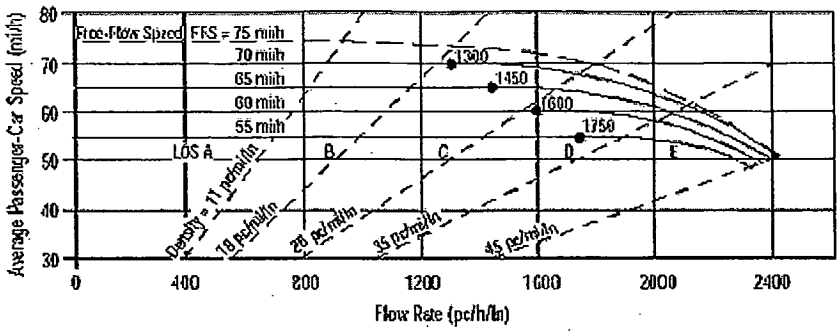
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1545*	pc/h/ln	Design LOS	
S	*69.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*22.2*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*5733*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

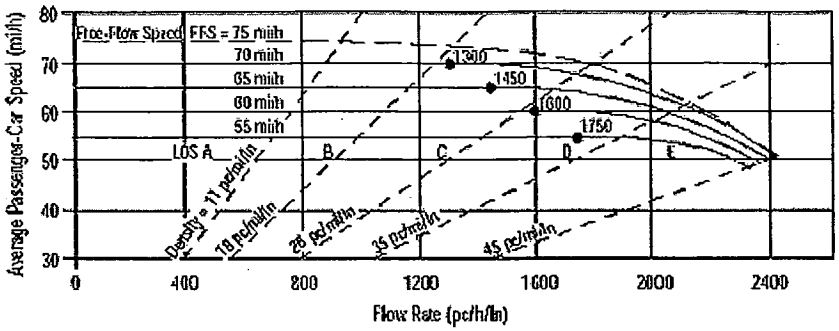
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2335*	pc/h/ln	Design LOS	
S	*55.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*41.9*	pc/mi/ln	S	mi/h
LOS	*E*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5123*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

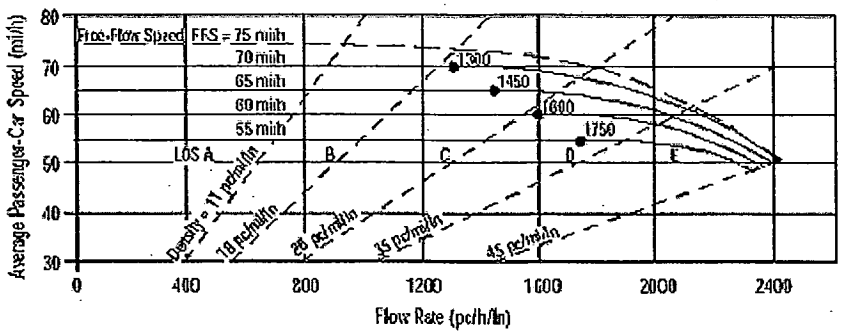
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2086*	pc/h/ln	Design LOS	
S	*63.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*33.1*	pc/mi/ln	S	mi/h
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☑ Planning Data

Flow Inputs

Volume, V	*6061*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

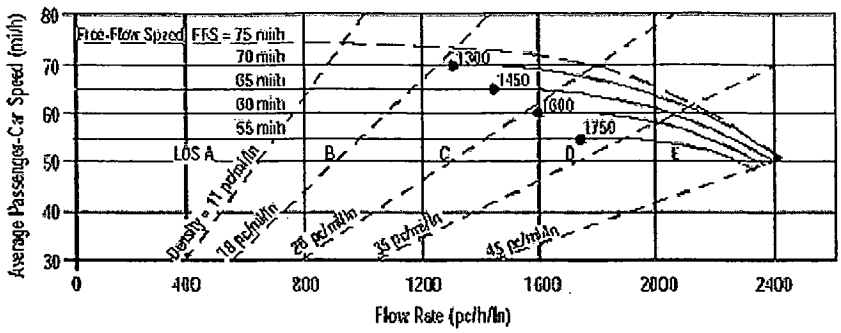
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2468*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3963*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

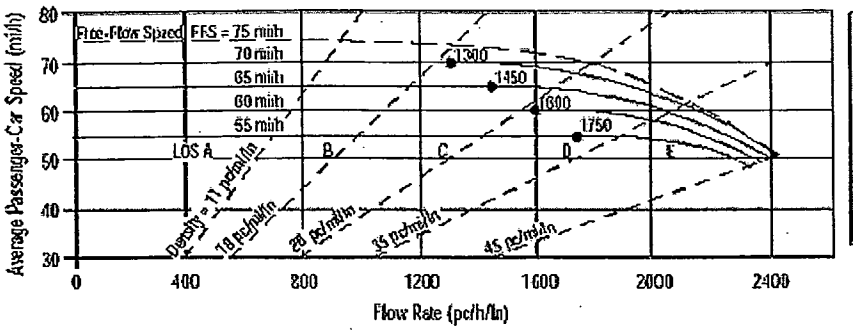
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1614*	pc/h/ln	Design LOS	
S	*69.4*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*23.3*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 No Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alts A, B & C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*6800*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) *2769*		pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 24

2030 NO PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.882	
Flt Protected					0.994	
Satd. Flow (prot)	0	1473	1557	0	1216	0
Flt Permitted					0.994	
Satd. Flow (perm)	0	1473	1557	0	1216	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					264	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	481	291	0	34	232
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	547	331	0	39	264
Lane Group Flow (vph)	0	547	331	0	303	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	44.0	44.0	0.0	26.0	0.0
Total Split (%)	0.0%	62.9%	62.9%	0.0%	37.1%	0.0%
Maximum Green (s)		39.4	39.4		21.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		40.0	40.0		22.0	
Actuated g/C Ratio		0.57	0.57		0.31	
v/c Ratio		0.65	0.37		0.54	
Control Delay		14.8	1.7		8.1	
Queue Delay		0.0	0.0		0.0	
Total Delay		14.8	1.7		8.1	
LOS		B	A		A	
Approach Delay		14.8	1.7		8.1	
Approach LOS		B	A		A	
90th %ile Green (s)		39.4	39.4		21.4	
90th %ile Term Code		Coord	Coord		MaxR	

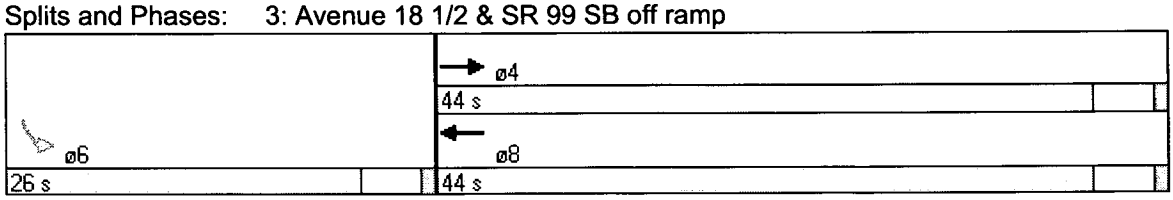
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		39.4	39.4		21.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		39.4	39.4		21.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		39.4	39.4		21.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		39.4	39.4		21.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		145	6		12	
Queue Length 95th (ft)		238	m6		67	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		842	890		563	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.65	0.37		0.54	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 60 (86%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 9.4 Intersection LOS: A
Intersection Capacity Utilization 48.2% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.885	
Flt Protected					0.993	
Satd. Flow (prot)	0	1473	1557	0	1219	0
Flt Permitted					0.993	
Satd. Flow (perm)	0	1473	1557	0	1219	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					429	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	634	339	0	65	380
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	720	385	0	74	432
Lane Group Flow (vph)	0	720	385	0	506	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	45.0	45.0	0.0	25.0	0.0
Total Split (%)	0.0%	64.3%	64.3%	0.0%	35.7%	0.0%
Maximum Green (s)		40.4	40.4		20.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		41.0	41.0		21.0	
Actuated g/C Ratio		0.59	0.59		0.30	
v/c Ratio		0.83	0.42		0.76	
Control Delay		22.9	1.3		13.3	
Queue Delay		0.0	0.0		0.0	
Total Delay		22.9	1.3		13.3	
LOS		C	A		B	
Approach Delay		22.9	1.3		13.3	
Approach LOS		C	A		B	
90th %ile Green (s)		40.4	40.4		20.4	
90th %ile Term Code		Coord	Coord		MaxR	

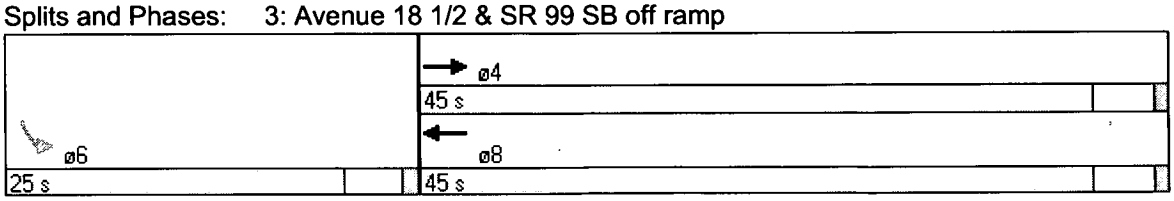
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		40.4	40.4		20.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		40.4	40.4		20.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		40.4	40.4		20.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		40.4	40.4		20.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		225	1		25	
Queue Length 95th (ft)		#442	m1		#141	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		863	912		666	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.83	0.42		0.76	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 56 (80%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 14.8 Intersection LOS: B
Intersection Capacity Utilization 67.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.959				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1220	1284	0	0	1672	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1220	1284	0	0	1672	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					31				21			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	238	81	0	0	109	48	243	0	36	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	270	92	0	0	124	55	276	0	41	0	0	0
Lane Group Flow (vph)	270	92	0	0	179	0	0	276	41	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	25.0	47.0	0.0	0.0	22.0	0.0	23.0	23.0	23.0	0.0	0.0	0.0
Total Split (%)	35.7%	67.1%	0.0%	0.0%	31.4%	0.0%	32.9%	32.9%	32.9%	0.0%	0.0%	0.0%
Maximum Green (s)	20.4	42.4			17.4		18.4	18.4	18.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	21.0	44.6			19.6			17.4	17.4			
Actuated g/C Ratio	0.30	0.64			0.28			0.25	0.25			
v/c Ratio	0.74	0.11			0.37			0.83	0.13			
Control Delay	24.2	3.0			20.0			47.1	13.4			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	24.2	3.0			20.0			47.1	13.4			

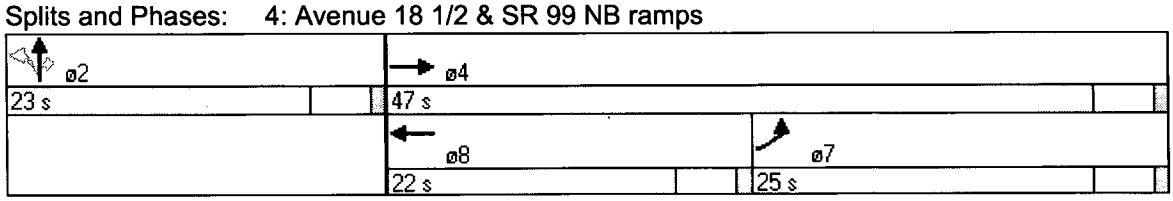
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B			D	B			
Approach Delay		18.8			20.0			42.7				
Approach LOS		B			B			D				
90th %ile Green (s)	20.4	42.4			17.4		18.4	18.4	18.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	20.4	42.4			17.4		18.4	18.4	18.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	20.4	42.4			17.4		18.4	18.4	18.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	20.4	44.1			19.1		16.7	16.7	16.7			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	20.4	48.6			23.6		12.2	12.2	12.2			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	104	6			52			109	6			
Queue Length 95th (ft)	#200	m9			102			#214	28			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	366	818			490			363	340			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.74	0.11			0.37			0.76	0.12			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.9 Intersection LOS: C
Intersection Capacity Utilization 48.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.976				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1480	1557	0	0	1613	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1480	1557	0	0	1613	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					15				39			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	336	112	0	0	160	35	281	0	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	382	127	0	0	182	40	319	0	89	0	0	0
Lane Group Flow (vph)	382	127	0	0	222	0	0	319	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	26.0	48.0	0.0	0.0	22.0	0.0	22.0	22.0	22.0	0.0	0.0	0.0
Total Split (%)	37.1%	68.6%	0.0%	0.0%	31.4%	0.0%	31.4%	31.4%	31.4%	0.0%	0.0%	0.0%
Maximum Green (s)	21.4	43.4			17.4		17.4	17.4	17.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	20.5	44.8			20.3			17.2	17.2			
Actuated g/C Ratio	0.29	0.64			0.29			0.25	0.25			
v/c Ratio	0.88	0.13			0.46			0.86	0.25			
Control Delay	30.6	1.6			24.1			49.6	15.1			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	30.6	1.6			24.1			49.6	15.1			

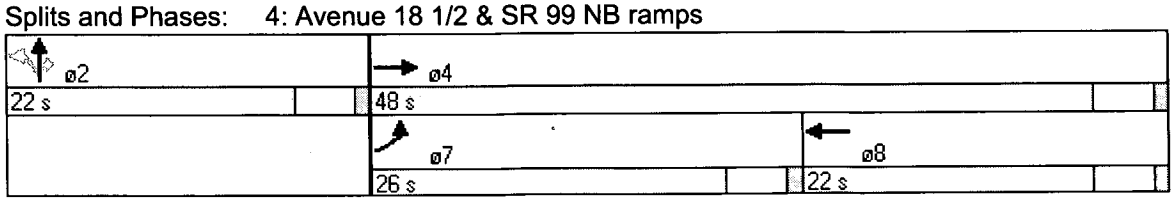
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		23.4			24.1			42.1				
Approach LOS		C			C			D				
90th %ile Green (s)	21.4	43.4			17.4		17.4	17.4	17.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	21.4	43.4			17.4		17.4	17.4	17.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	21.4	43.4			17.4		17.4	17.4	17.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	20.6	43.4			18.2		17.4	17.4	17.4			
30th %ile Term Code	Gap	Coord			Coord		Max	Max	Max			
10th %ile Green (s)	14.9	47.4			27.9		13.4	13.4	13.4			
10th %ile Term Code	Gap	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	94	5			76			129	17			
Queue Length 95th (ft)	m161	m7			136			#250	49			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	465	997			478			387	375			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.82	0.13			0.46			0.82	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 38 (54%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 30.2 Intersection LOS: C
Intersection Capacity Utilization 67.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3374	3505	0	1703	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	3374	3505	0	1703	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						46
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1331	1245	0	155	244
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	1512	1415	0	176	277
Lane Group Flow (vph)	0	1512	1415	0	176	277
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	58.1	58.1	0.0	31.9	31.9
Total Split (%)	0.0%	64.6%	64.6%	0.0%	35.4%	35.4%
Maximum Green (s)		52.8	52.8		26.6	26.6
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		62.1	62.1		19.9	19.9
Actuated g/C Ratio		0.69	0.69		0.22	0.22
v/c Ratio		0.65	0.58		0.47	0.74
Control Delay		3.2	3.5		33.3	38.8
Queue Delay		0.2	0.0		0.0	0.0
Total Delay		3.4	3.5		33.3	38.8
LOS		A	A		C	D
Approach Delay		3.4	3.5		36.7	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		D	
Queue Length 50th (ft)		39	14		87	124
Queue Length 95th (ft)		79	200		129	182
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2330	2420		528	504
Starvation Cap Reductn		211	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.71	0.58		0.33	0.55

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 69 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 7.9 Intersection LOS: A
Intersection Capacity Utilization 68.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3343	0	1671	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3343	0	1671	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						15
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	2594	1964	0	334	347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	2948	2232	0	380	394
Lane Group Flow (vph)	0	2948	2232	0	380	394
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	89.0	89.0	0.0	31.0	31.0
Total Split (%)	0.0%	74.2%	74.2%	0.0%	25.8%	25.8%
Maximum Green (s)		83.7	83.7		25.7	25.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		85.0	85.0		27.0	27.0
Actuated g/C Ratio		0.71	0.71		0.22	0.22
v/c Ratio		1.20	0.94		1.01	1.13
Control Delay		107.8	7.1		95.7	130.2
Queue Delay		23.2	14.0		0.0	1.3
Total Delay		130.9	21.1		95.7	131.5
LOS		F	C		F	F
Approach Delay		130.9	21.1		113.9	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	C		F	
Queue Length 50th (ft)		~1491	418		~302	~346
Queue Length 95th (ft)		m361	m195		#485	#526
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2459	2368		376	348
Starvation Cap Reductn		102	30		0	0
Spillback Cap Reductn		0	188		0	1
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.25	1.02		1.01	1.14

Intersection Summary

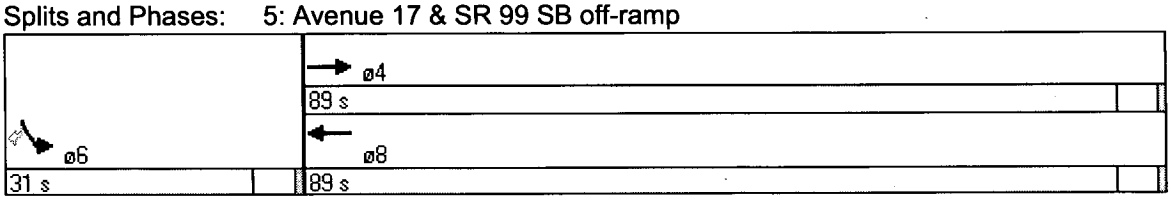
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 81 (68%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.20
Intersection Signal Delay: 87.5 Intersection LOS: F
Intersection Capacity Utilization 101.1% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



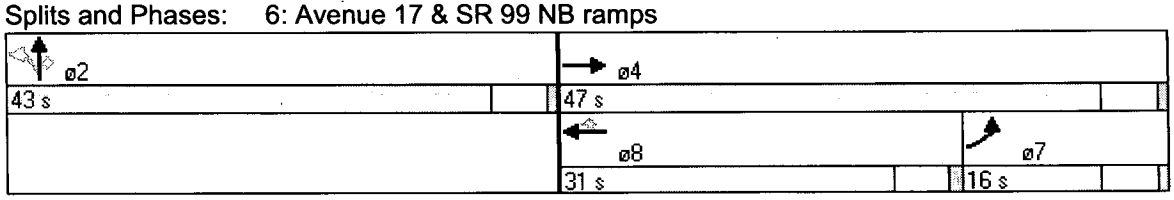
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.956				
Satd. Flow (prot)	1752	3505	0	0	3539	1583	1681	1692	2787	0	0	0
Flt Permitted	0.950						0.950	0.956				
Satd. Flow (perm)	1752	3505	0	0	3539	1583	1681	1692	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						81			434			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	146	391	0	0	758	71	1003	47	382	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	166	444	0	0	861	81	1140	53	434	0	0	0
Lane Group Flow (vph)	166	444	0	0	861	81	581	612	434	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	16.0	47.0	0.0	0.0	31.0	31.0	43.0	43.0	43.0	0.0	0.0	0.0
Total Split (%)	17.8%	52.2%	0.0%	0.0%	34.4%	34.4%	47.8%	47.8%	47.8%	0.0%	0.0%	0.0%
Maximum Green (s)	10.7	41.7			25.7	25.7	37.7	37.7	37.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	12.0	44.9			28.9	28.9	37.1	37.1	37.1			
Actuated g/C Ratio	0.13	0.50			0.32	0.32	0.41	0.41	0.41			
v/c Ratio	0.71	0.25			0.76	0.14	0.84	0.88	0.31			
Control Delay	39.1	6.0			33.4	6.4	35.8	39.5	2.3			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	39.1	6.0			33.4	6.4	35.8	39.5	2.3			
LOS	D	A			C	A	D	D	A			
Approach Delay		15.0			31.0			28.3				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			C				
Queue Length 50th (ft)	83	34			237	0	291	315	0			
Queue Length 95th (ft)	m#163	34			301	30	#430	#501	26			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	234	1747			1135	563	728	733	1454			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.71	0.25			0.76	0.14	0.80	0.83	0.30			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 87 (97%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 26.5 Intersection LOS: C
Intersection Capacity Utilization 68.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						170			107			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	220	965	0	0	1354	236	1492	5	1379	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	250	1097	0	0	1539	268	1695	6	1567	0	0	0
Lane Group Flow (vph)	250	1097	0	0	1539	268	848	853	1567	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	18.0	65.0	0.0	0.0	47.0	47.0	55.0	55.0	55.0	0.0	0.0	0.0
Total Split (%)	15.0%	54.2%	0.0%	0.0%	39.2%	39.2%	45.8%	45.8%	45.8%	0.0%	0.0%	0.0%
Maximum Green (s)	12.7	59.7			41.7	41.7	49.7	49.7	49.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	14.0	61.0			43.0	43.0	51.0	51.0	51.0			
Actuated g/C Ratio	0.12	0.51			0.36	0.36	0.42	0.42	0.42			
v/c Ratio	1.21	0.61			1.21	0.40	1.19	1.19	1.26			
Control Delay	138.3	15.7			138.5	12.2	130.7	131.4	152.3			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	138.3	15.7			138.5	12.2	130.7	131.4	152.3			
LOS	F	B			F	B	F	F	F			
Approach Delay		38.4			119.8			141.2				
Approach LOS		D			F			F				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	~236	237			~767	52	~832	~838	~840			
Queue Length 95th (ft)	m#175	m185			#874	117	#1051	#1057	#957			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	207	1799			1268	676	714	717	1246			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	1.21	0.61			1.21	0.40	1.19	1.19	1.26			

Intersection Summary

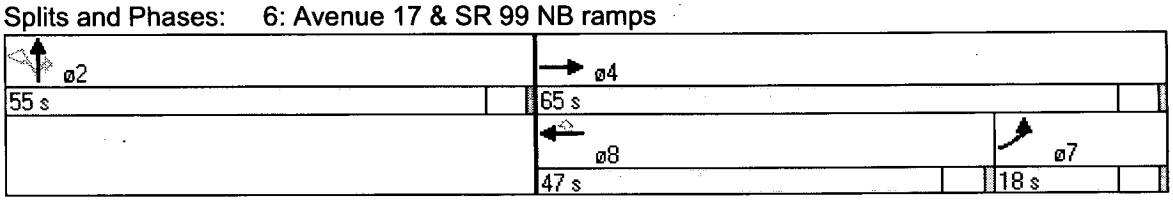
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 107 (89%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 113.6 Intersection LOS: F
Intersection Capacity Utilization 101.1% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



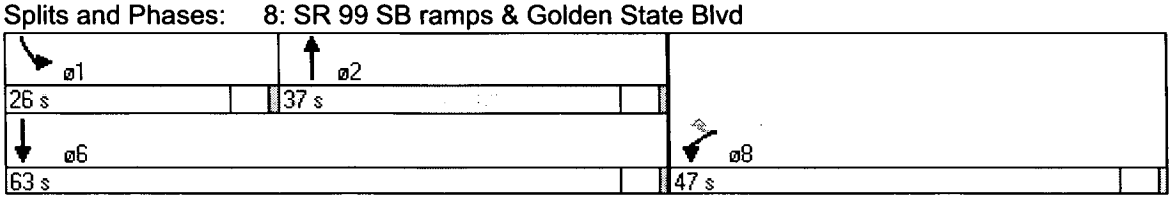
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.889			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1626	1455	1656	0	1770	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1626	1455	1656	0	1770	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		338	214			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	524	299	89	407	276	87
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	595	340	101	462	314	99
Lane Group Flow (vph)	595	340	563	0	314	99
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	47.0	47.0	37.0	0.0	26.0	63.0
Total Split (%)	42.7%	42.7%	33.6%	0.0%	23.6%	57.3%
Maximum Green (s)	42.4	42.4	32.4		21.4	58.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	42.7	42.7	33.7		21.6	59.3
Actuated g/C Ratio	0.39	0.39	0.31		0.20	0.54
v/c Ratio	0.94	0.44	0.86		0.90	0.10
Control Delay	57.4	4.4	16.4		72.8	13.0
Queue Delay	8.3	0.0	10.5		0.0	0.0
Total Delay	65.7	4.4	26.9		72.8	13.0
LOS	E	A	C		E	B
Approach Delay	43.4		26.9			58.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	D		C			E
Queue Length 50th (ft)	398	1	107		217	33
Queue Length 95th (ft)	#601	52	m68		#362	59
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	647	782	668		358	1016
Starvation Cap Reductn	0	0	88		0	0
Spillback Cap Reductn	41	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.98	0.43	0.97		0.88	0.10

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 41.8 Intersection LOS: D
Intersection Capacity Utilization 84.1% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	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
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.892			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1538	1662	0	1641	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1538	1662	0	1641	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		486	168			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	933	778	143	560	350	131
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	1060	884	162	636	398	149
Lane Group Flow (vph)	1060	884	798	0	398	149
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	56.0	56.0	40.0	0.0	24.0	64.0
Total Split (%)	46.7%	46.7%	33.3%	0.0%	20.0%	53.3%
Maximum Green (s)	51.4	51.4	35.4		19.4	59.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	52.0	52.0	36.0		20.0	60.0
Actuated g/C Ratio	0.43	0.43	0.30		0.17	0.50
v/c Ratio	1.42	0.94	1.30		1.45	0.17
Control Delay	227.4	32.9	153.4		259.5	17.1
Queue Delay	74.6	0.0	289.7		0.0	0.2
Total Delay	302.0	32.9	443.1		259.5	17.3
LOS	F	C	F		F	B
Approach Delay	179.7		443.1			193.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	F		F			F
Queue Length 50th (ft)	~1108	355	~692		~421	61
Queue Length 95th (ft)	#1319	#648	m45		#600	99
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	745	942	616		274	864
Starvation Cap Reductn	0	0	205		0	0
Spillback Cap Reductn	78	0	0		0	288
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.59	0.94	1.94		1.45	0.26

Intersection Summary

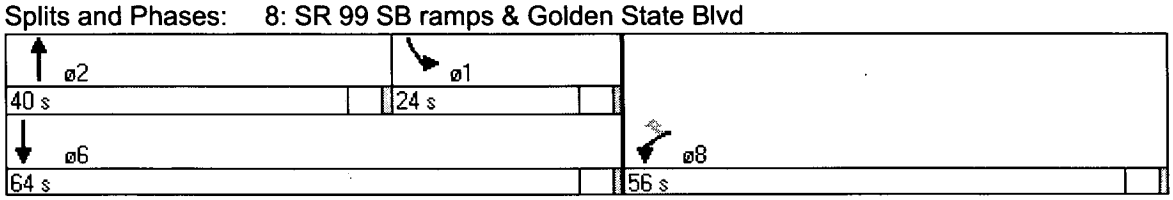
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 8 (7%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.45
Intersection Signal Delay: 245.9 Intersection LOS: F
Intersection Capacity Utilization 123.1% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.947			0.853				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		28			400				84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	242	296	24	113	446	246	70	8	406	516	18	77
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	263	322	26	123	485	267	76	9	441	561	20	84
Lane Group Flow (vph)	263	322	26	123	752	0	76	450	0	561	20	84
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	17.0	39.7	39.7	19.7	42.4	0.0	15.2	20.6	0.0	30.0	35.4	35.4
Total Split (%)	15.5%	36.1%	36.1%	17.9%	38.5%	0.0%	13.8%	18.7%	0.0%	27.3%	32.2%	32.2%
Maximum Green (s)	12.4	35.1	35.1	15.1	37.8		10.6	16.0		25.4	30.8	30.8
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	13.0	42.9	42.9	13.1	43.0		9.9	12.0		26.0	30.2	30.2
Actuated g/C Ratio	0.12	0.39	0.39	0.12	0.39		0.09	0.11		0.24	0.27	0.27
v/c Ratio	1.36	0.48	0.04	0.61	1.10		0.52	0.88		1.38	0.04	0.17
Control Delay	228.1	30.0	9.6	56.6	93.9		60.7	26.3		216.3	23.6	4.7
Queue Delay	0.0	0.2	0.0	0.0	38.8		0.0	1.0		42.2	0.0	0.0
Total Delay	228.1	30.2	9.6	56.6	132.7		60.7	27.3		258.5	23.6	4.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	C	A	E	F		E	C		F	C	A
Approach Delay		114.5			122.0			32.1			219.4	
Approach LOS		F			F			C			F	
Queue Length 50th (ft)	~245	171	0	88	~613		51	33		~511	6	4
Queue Length 95th (ft)	#408	282	20	m138	#879		100	#192		m#587	m7	m5
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	194	674	589	243	681		164	558		406	536	514
Starvation Cap Reductn	0	0	0	0	0		0	0		26	0	0
Spillback Cap Reductn	0	60	0	0	52		0	21		10	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.36	0.52	0.04	0.51	1.20		0.46	0.84		1.48	0.04	0.16

Intersection Summary

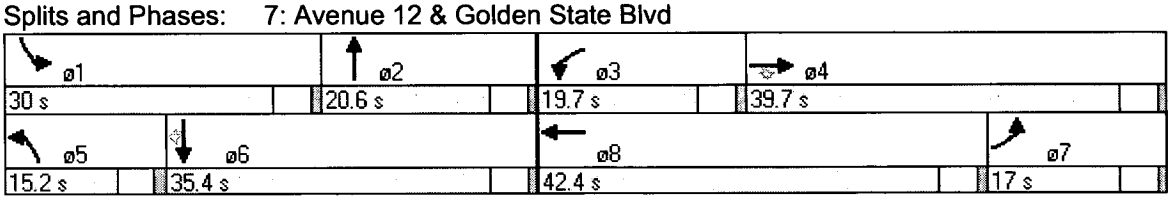
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 100 (91%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 126.8 Intersection LOS: F
Intersection Capacity Utilization 119.3% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.957			0.857				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		18			280				70
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	420	409	14	138	652	260	149	23	466	988	12	64
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	457	445	15	150	709	283	162	25	507	1074	13	70
Lane Group Flow (vph)	457	445	15	150	992	0	162	532	0	1074	13	70
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	20.0	43.6	43.6	18.4	42.0	0.0	24.1	21.0	0.0	37.0	33.9	33.9
Total Split (%)	16.7%	36.3%	36.3%	15.3%	35.0%	0.0%	20.1%	17.5%	0.0%	30.8%	28.3%	28.3%
Maximum Green (s)	15.4	39.0	39.0	13.8	37.4		19.5	16.4		32.4	29.3	29.3
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	16.0	40.3	40.3	13.7	38.0		42.6	17.0		33.0	7.4	7.4
Actuated g/C Ratio	0.13	0.34	0.34	0.11	0.32		0.36	0.14		0.28	0.06	0.06
v/c Ratio	2.03	0.75	0.03	0.77	1.79		0.27	1.17		2.31	0.12	0.44
Control Delay	506.9	44.7	12.0	77.3	381.8		29.6	118.6		613.3	72.9	35.7
Queue Delay	206.3	0.8	0.0	0.0	8.8		0.0	137.0		81.4	0.0	0.0
Total Delay	713.2	45.5	12.0	77.3	390.6		29.6	255.6		694.7	72.9	35.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D	B	E	F		C	F		F	E	D
Approach Delay		377.7			349.4			202.8			647.8	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~555	307	0	119	~1139		88	~292		~1344	11	24
Queue Length 95th (ft)	#762	436	16	m144	m#1278		151	#512		m#925	m11	m16
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	225	596	516	204	555		598	456		464	443	429
Starvation Cap Reductn	0	0	0	0	0		0	0		18	0	0
Spillback Cap Reductn	102	30	0	0	6		0	96		240	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	3.72	0.79	0.03	0.74	1.81		0.27	1.48		4.79	0.03	0.16

Intersection Summary

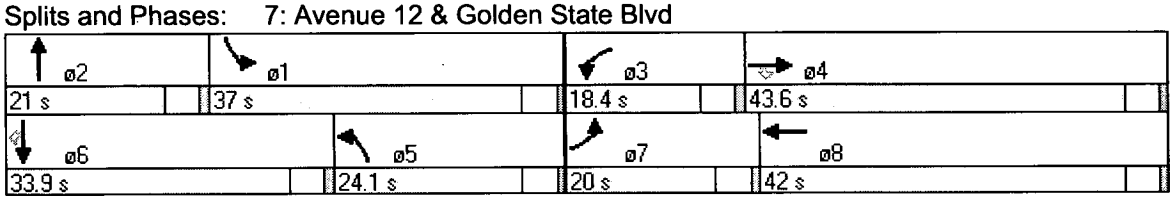
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 20 (17%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.31
Intersection Signal Delay: 418.3 Intersection LOS: F
Intersection Capacity Utilization 171.5% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						841			87			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	106	1112	0	0	559	1058	245	11	409	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	120	1264	0	0	635	1202	278	12	465	0	0	0
Lane Group Flow (vph)	120	1264	0	0	635	1202	0	290	465	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	12.2	77.0	0.0	0.0	64.8	64.8	33.0	33.0	33.0	0.0	0.0	0.0
Total Split (%)	11.1%	70.0%	0.0%	0.0%	58.9%	58.9%	30.0%	30.0%	30.0%	0.0%	0.0%	0.0%
Maximum Green (s)	7.6	72.4			60.2	60.2	28.4	28.4	28.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	8.2	73.0			60.8	60.8		29.0	29.0			
Actuated g/C Ratio	0.07	0.66			0.55	0.55		0.26	0.26			
v/c Ratio	0.92	1.03			0.63	0.97		0.68	1.05			
Control Delay	83.5	42.9			20.4	28.4		45.6	88.7			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	83.5	42.9			20.4	28.4		45.6	88.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D			C	C		D	F			
Approach Delay		46.4			25.6			72.1				
Approach LOS		D			C			E				
Queue Length 50th (ft)	83	~659			292	327		184	~309			
Queue Length 95th (ft)	m#104	m562			397	#788		273	#494			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	131	1224			1010	1235		427	444			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.92	1.03			0.63	0.97		0.68	1.05			

Intersection Summary

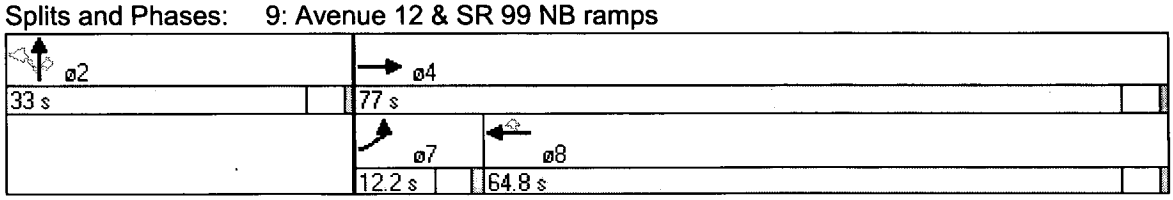
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 11 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 41.7 Intersection LOS: D
Intersection Capacity Utilization 95.5% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						901			13			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	126	1735	0	0	759	1544	292	3	658	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	143	1972	0	0	862	1755	332	3	748	0	0	0
Lane Group Flow (vph)	143	1972	0	0	862	1755	0	335	748	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	13.0	77.0	0.0	0.0	64.0	64.0	43.0	43.0	43.0	0.0	0.0	0.0
Total Split (%)	10.8%	64.2%	0.0%	0.0%	53.3%	53.3%	35.8%	35.8%	35.8%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	72.4			59.4	59.4	38.4	38.4	38.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	73.0			60.0	60.0		39.0	39.0			
Actuated g/C Ratio	0.08	0.61			0.50	0.50		0.32	0.32			
v/c Ratio	1.11	1.79			0.95	1.44		0.62	1.53			
Control Delay	111.9	379.3			49.9	218.6		40.3	277.6			
Queue Delay	0.0	1.5			0.0	0.0		0.0	0.0			
Total Delay	111.9	380.7			49.9	218.6		40.3	277.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			D	F		D	F			
Approach Delay		362.6			163.0			204.2				
Approach LOS		F			F			F				
Queue Length 50th (ft)	~129	~2349			617	~1485		219	~810			
Queue Length 95th (ft)	m86	m#1324			#870	#1684		312	#1018			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	129	1101			905	1220		540	490			
Starvation Cap Reductn	0	2			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	1.11	1.79			0.95	1.44		0.62	1.53			

Intersection Summary

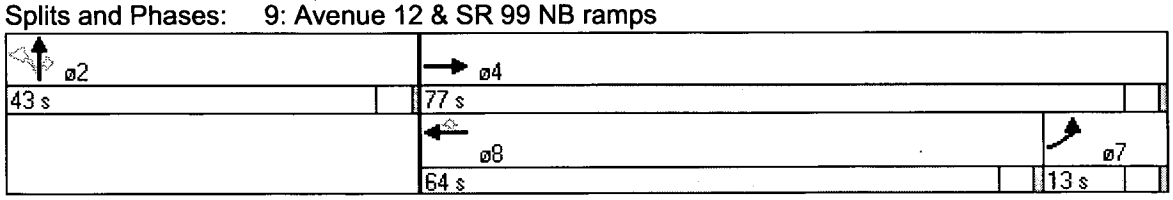
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 115 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.79
Intersection Signal Delay: 243.3 Intersection LOS: F
Intersection Capacity Utilization 138.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	317	1	21	316	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	18	10	9	1	34	30
Percent Heavy Vehicles	11	–	–	19	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	17	10	9	1	32	28
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	22	343	10	16	344	1
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	22		65			37	
C (m) (veh/h)	1157	1125		424			325	
v/c	0.01	0.02		0.15			0.11	
95% queue length	0.04	0.06		0.54			0.38	
Control Delay (s/veh)	8.2	8.3		15.0			17.5	
LOS	A	A		C			C	
Approach Delay (s/veh)	–	–	15.0			17.5		
Approach LOS	–	–	C			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	19	460	2	32	495	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	13	14	6	1	20	80
Percent Heavy Vehicles	13	–	–	15	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	12	13	6	1	19	74
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	34	538	10	20	499	2
Percent Heavy Vehicles	7	7	7	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	20	34		101			33	
C (m) (veh/h)	968	1000		394			164	
v/c	0.02	0.03		0.26			0.20	
95% queue length	0.06	0.11		1.01			0.72	
Control Delay (s/veh)	8.8	8.7		17.3			32.4	
LOS	A	A		C			D	
Approach Delay (s/veh)	–	–	17.3			32.4		
Approach LOS	–	–	C			D		

Copyright © 2005 University of Florida, All Rights Reserved

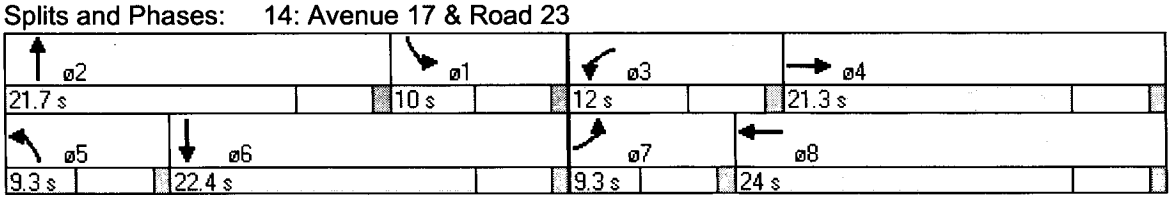
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.924			0.962				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1863	1829	0	1770	1721	0	1770	1792	0	1770	1863	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	1863	1829	0	1770	1721	0	1770	1792	0	1770	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			38			26				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	0	60	8	131	34	35	5	260	87	88	200	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
Adj. Flow (vph)	0	65	9	142	37	38	5	283	95	96	217	0
Lane Group Flow (vph)	0	74	0	142	75	0	5	378	0	96	217	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	12.0	24.0	0.0	9.3	21.7	0.0	10.0	22.4	0.0
Total Split (%)	14.3%	32.8%	0.0%	18.5%	36.9%	0.0%	14.3%	33.4%	0.0%	15.4%	34.5%	0.0%
Maximum Green (s)	4.0	16.0		6.7	18.7		4.0	16.4		4.7	17.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)		9.6		9.1	18.1		5.7	30.0		6.5	34.4	
Actuated g/C Ratio		0.15		0.14	0.29		0.08	0.49		0.10	0.56	
v/c Ratio		0.27		0.56	0.14		0.03	0.42		0.54	0.21	
Control Delay		20.6		31.3	7.5		26.8	15.5		36.2	10.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		20.6		31.3	7.5		26.8	15.5		36.2	10.6	
LOS		C		C	A		C	B		D	B	
Approach Delay		20.6			23.1			15.6			18.4	
Approach LOS		C			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		20		46	8		2	100		31	39	
Queue Length 95th (ft)		50		#112	29		11	#198		#84	110	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)		464		254	621		148	897		178	1054	
Starvation Cap Reductn		0		0	0		0	0		0	0	
Spillback Cap Reductn		0		0	0		0	0		0	0	
Storage Cap Reductn		0		0	0		0	0		0	0	
Reduced v/c Ratio		0.16		0.56	0.12		0.03	0.42		0.54	0.21	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 60.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 18.5 Intersection LOS: B
Intersection Capacity Utilization 47.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



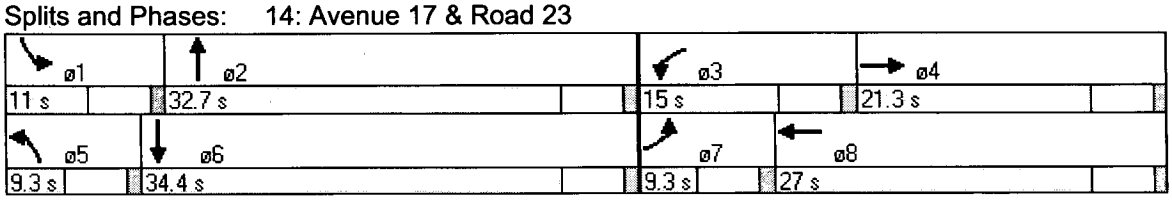
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.911			0.939			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1822	0	1770	1697	0	1770	1749	0	1770	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1822	0	1770	1697	0	1770	1749	0	1770	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			92			49			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	9	107	18	193	63	91	4	298	206	110	314	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	116	20	210	68	99	4	324	224	120	341	8
Lane Group Flow (vph)	10	136	0	210	167	0	4	548	0	120	349	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	15.0	27.0	0.0	9.3	32.7	0.0	11.0	34.4	0.0
Total Split (%)	11.6%	26.6%	0.0%	18.8%	33.8%	0.0%	11.6%	40.9%	0.0%	13.8%	43.0%	0.0%
Maximum Green (s)	4.0	16.0		9.7	21.7		4.0	27.4		5.7	29.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	11.6		11.0	22.1		5.3	31.7		7.0	38.4	
Actuated g/C Ratio	0.07	0.16		0.15	0.31		0.07	0.44		0.09	0.53	
v/c Ratio	0.08	0.47		0.77	0.29		0.03	0.69		0.71	0.35	
Control Delay	37.7	31.4		52.7	11.0		36.5	23.9		59.2	13.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.7	31.4		52.7	11.0		36.5	23.9		59.2	13.5	
LOS	D	C		D	B		D	C		E	B	
Approach Delay		31.8			34.2			24.0			25.2	
Approach LOS		C			C			C			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	4	53		95	23		2	197		55	85	
Queue Length 95th (ft)	20	103		#220	75		11	#395		#146	202	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	119	403		273	634		119	797		168	991	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.34		0.77	0.26		0.03	0.69		0.71	0.35	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 72
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 27.6 Intersection LOS: C
Intersection Capacity Utilization 65.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



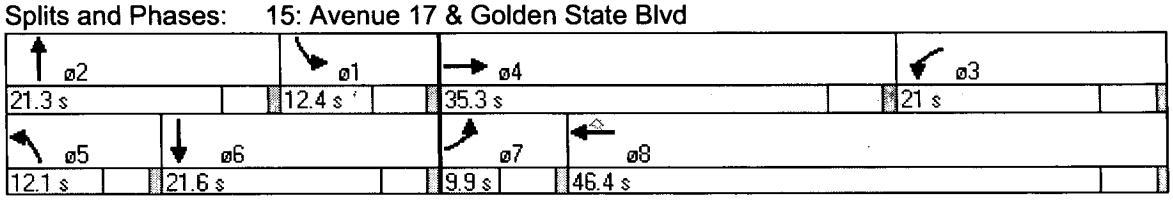
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.990				0.850		0.861			0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1736	3471	1553	1492	1352	0	3433	1706	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3504	0	1736	3471	1553	1492	1352	0	3433	1706	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				246		285			14	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	29	841	62	231	998	226	49	21	262	206	10	13
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	32	914	67	251	1085	246	53	23	285	224	11	14
Lane Group Flow (vph)	32	981	0	251	1085	246	53	308	0	224	25	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.9	35.3	0.0	21.0	46.4	46.4	12.1	21.3	0.0	12.4	21.6	0.0
Total Split (%)	11.0%	39.2%	0.0%	23.3%	51.6%	51.6%	13.4%	23.7%	0.0%	13.8%	24.0%	0.0%
Maximum Green (s)	4.6	30.0		15.7	41.1	41.1	7.5	16.7		7.1	17.0	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.9	31.3		17.0	46.4	46.4	7.5	17.3		8.4	22.4	
Actuated g/C Ratio	0.07	0.35		0.19	0.52	0.52	0.08	0.19		0.09	0.25	
v/c Ratio	0.28	0.80		0.77	0.61	0.27	0.43	0.63		0.70	0.06	
Control Delay	46.4	32.3		43.1	12.9	1.8	49.9	11.8		52.3	19.5	
Queue Delay	0.0	0.0		0.0	0.1	0.0	0.0	0.0		0.0	0.0	
Total Delay	46.4	32.3		43.1	13.1	1.8	49.9	11.8		52.3	19.5	
LOS	D	C		D	B	A	D	B		D	B	
Approach Delay		32.8			16.1			17.4			49.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	18	260		124	222	17	29	11		64	5	
Queue Length 95th (ft)	47	338		m#243	305	m20	66	90		#111	26	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	116	1224		328	1788	920	134	490		320	436	
Starvation Cap Reductn	0	0		0	120	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.28	0.80		0.77	0.65	0.27	0.40	0.63		0.70	0.06	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 24.1 Intersection LOS: C
Intersection Capacity Utilization 74.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



2030 No Project PM
15: Avenue 17 & Golden State Blvd

9/12/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.994				0.850		0.858			0.907	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3518	0	1656	3312	1482	1736	1568	0	3433	1690	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3518	0	1656	3312	1482	1736	1568	0	3433	1690	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				371		271			36	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	45	1598	71	334	1507	410	110	28	476	512	20	33
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	49	1737	77	363	1638	446	120	30	517	557	22	36
Lane Group Flow (vph)	49	1814	0	363	1638	446	120	547	0	557	58	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	54.0	0.0	24.0	68.7	68.7	19.9	23.0	0.0	19.0	22.1	0.0
Total Split (%)	7.8%	45.0%	0.0%	20.0%	57.3%	57.3%	16.6%	19.2%	0.0%	15.8%	18.4%	0.0%
Maximum Green (s)	4.0	48.7		18.7	63.4	63.4	15.3	18.4		13.7	17.5	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	50.0		20.0	66.6	66.6	15.9	19.0		15.0	18.1	
Actuated g/C Ratio	0.04	0.42		0.17	0.56	0.56	0.13	0.16		0.12	0.15	
v/c Ratio	0.63	1.23		1.32	0.89	0.45	0.52	1.15		1.30	0.20	
Control Delay	89.7	143.9		192.6	23.8	3.3	57.5	112.4		192.3	23.4	
Queue Delay	0.0	33.0		0.0	31.9	0.5	0.0	72.0		0.0	0.0	
Total Delay	89.7	176.9		192.6	55.6	3.9	57.5	184.4		192.3	23.4	
LOS	F	F		F	E	A	E	F		F	C	
Approach Delay		174.6			66.5			161.6			176.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			E			F			F	
Queue Length 50th (ft)	38	~919		~362	511	23	88	~310		~284	15	
Queue Length 95th (ft)	#100	#1061		m#382	m562	m33	151	#531		#397	55	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	78	1469		276	1837	987	230	476		429	285	
Starvation Cap Reductn	0	0		0	299	224	0	0		0	0	
Spillback Cap Reductn	0	83		0	0	0	0	60		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.63	1.31		1.32	1.07	0.58	0.52	1.31		1.30	0.20	

Intersection Summary

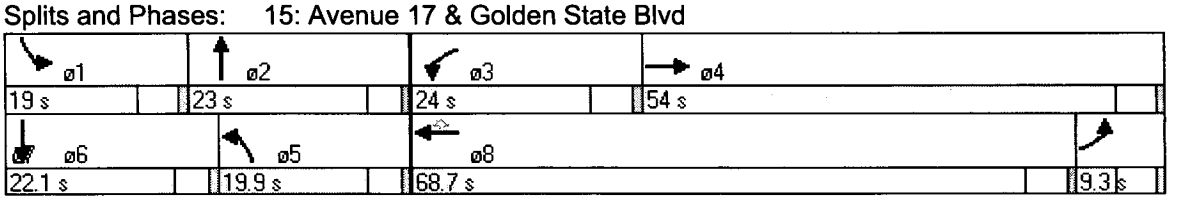
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 125.9 Intersection LOS: F
Intersection Capacity Utilization 123.8% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.871			0.870			0.994			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1532	0	1671	1531	0	1770	3518	0	1770	3497	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1532	0	1671	1531	0	1770	3518	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		78			159			5			12	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	74	12	72	59	22	146	172	1175	45	175	366	32
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
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	80	13	78	64	24	159	187	1277	49	190	398	35
Lane Group Flow (vph)	80	91	0	64	183	0	187	1326	0	190	433	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	10.0	21.9	0.0	9.0	20.9	0.0	21.7	43.1	0.0	16.0	37.4	0.0
Total Split (%)	11.1%	24.3%	0.0%	10.0%	23.2%	0.0%	24.1%	47.9%	0.0%	17.8%	41.6%	0.0%
Maximum Green (s)	5.1	17.0		4.1	16.0		16.8	38.2		11.1	32.5	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.1	9.7		5.1	9.0		13.3	37.4		11.4	40.1	
Actuated g/C Ratio	0.08	0.13		0.07	0.12		0.17	0.50		0.15	0.54	
v/c Ratio	0.60	0.35		0.57	0.57		0.61	0.75		0.70	0.23	
Control Delay	58.3	14.4		60.4	16.0		39.1	20.9		49.2	14.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	58.3	14.4		60.4	16.0		39.1	20.9		49.2	14.8	
LOS	E	B		E	B		D	C		D	B	
Approach Delay		34.9			27.5			23.2			25.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	40	6		32	11		87	276		92	66	
Queue Length 95th (ft)	#116	46		#100	69		159	425		#211	122	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	134	388		112	437		390	1830		292	1889	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.60	0.23		0.57	0.42		0.48	0.72		0.65	0.23	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 74.6
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 24.9 Intersection LOS: C
Intersection Capacity Utilization 71.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.954			0.867			0.978			0.958	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1777	0	1770	1615	0	1770	3461	0	1770	3391	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1777	0	1770	1615	0	1770	3461	0	1770	3391	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			178			31			92	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	65	118	52	74	35	269	35	1206	210	95	1015	392
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	128	57	80	38	292	38	1311	228	103	1103	426
Lane Group Flow (vph)	71	185	0	80	330	0	38	1539	0	103	1529	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	10.0	21.9	0.0	8.9	48.1	0.0	11.0	50.2	0.0
Total Split (%)	10.0%	23.2%	0.0%	11.1%	24.3%	0.0%	9.9%	53.4%	0.0%	12.2%	55.8%	0.0%
Maximum Green (s)	4.1	16.0		5.1	17.0		4.0	43.2		6.1	45.3	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	13.2		6.3	13.9		5.2	41.3		7.3	44.5	
Actuated g/C Ratio	0.07	0.17		0.08	0.18		0.06	0.53		0.09	0.57	
v/c Ratio	0.61	0.58		0.58	0.76		0.34	0.84		0.64	0.78	
Control Delay	65.2	37.4		58.7	28.6		49.6	23.2		59.9	18.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.2	37.4		58.7	28.6		49.6	23.2		59.9	18.1	
LOS	E	D		E	C		D	C		E	B	
Approach Delay		45.1			34.4			23.9			20.7	
Approach LOS		D			C			C			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	39	84		44	79		21	371		57	335	
Queue Length 95th (ft)	#112	151		#116	#179		53	#558		#142	465	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	116	403		139	507		112	1922		161	2043	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.61	0.46		0.58	0.65		0.34	0.80		0.64	0.75	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 78.3
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 25.1 Intersection LOS: C
Intersection Capacity Utilization 80.7% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	355	8	1	341	24
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	1	1	34	1	30
Percent Heavy Vehicles	8	–	–	10	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	32	1	28
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	370	26	1	385	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		65			3	
C (m) (veh/h)	1131	1123		393			375	
v/c	0.00	0.00		0.17			0.01	
95% queue length	0.00	0.00		0.59			0.02	
Control Delay (s/veh)	8.2	8.2		16.0			14.7	
LOS	A	A		C			B	
Approach Delay (s/veh)	–	–	16.0			14.7		
Approach LOS	–	–	C			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	505	34	1	492	112
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	2	2	40	3	48
Percent Heavy Vehicles	17	--	--	9	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	2	2	37	3	45
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	534	121	2	548	36
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	2	1		91			5	
C (m) (veh/h)	865	957		261			178	
v/c	0.00	0.00		0.35			0.03	
95% queue length	0.01	0.00		1.50			0.09	
Control Delay (s/veh)	9.2	8.8		26.0			25.8	
LOS	A	A		D			D	
Approach Delay (s/veh)	--	--	26.0			25.8		
Approach LOS	--	--	D			D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 7/21/2006 4:39 PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.944			0.987			0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1757	0	1626	1616	0	1504	1563	0	1570	1553	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1757	0	1626	1616	0	1504	1563	0	1570	1553	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			44			7			55	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	24	125	30	9	114	67	13	149	14	43	103	69
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	26	136	33	10	124	73	14	162	15	47	112	75
Lane Group Flow (vph)	26	169	0	10	197	0	14	177	0	47	187	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.8	0.0	10.6	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	36.6%	0.0%	16.3%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.5		5.3	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	13.5		5.5	11.9		5.5	28.3		6.7	30.3	
Actuated g/C Ratio	0.09	0.25		0.09	0.22		0.09	0.54		0.11	0.58	
v/c Ratio	0.16	0.38		0.07	0.51		0.10	0.21		0.26	0.20	
Control Delay	28.4	16.2		28.7	18.7		29.4	13.0		28.8	8.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.4	16.2		28.7	18.7		29.4	13.0		28.8	8.5	
LOS	C	B		C	B		C	B		C	A	
Approach Delay		17.9			19.2			14.2			12.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	5	27		2	27		3	16		9	12	
Queue Length 95th (ft)	31	96		17	103		21	101		46	85	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	161	581		149	516		138	853		180	926	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.16	0.29		0.07	0.38		0.10	0.21		0.26	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 52.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 15.9 Intersection LOS: B
Intersection Capacity Utilization 39.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: Avenue 14 & Road 23

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949			0.933			0.990			0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1670	0	1736	1705	0	1703	1775	0	1556	1566	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1670	0	1736	1705	0	1703	1775	0	1556	1566	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			61			5			35	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	65	89	46	15	154	124	51	230	16	95	221	93
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	71	97	50	16	167	135	55	250	17	103	240	101
Lane Group Flow (vph)	71	147	0	16	302	0	55	267	0	103	341	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.1	0.0	11.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	35.5%	0.0%	17.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	17.8		6.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	17.0		5.3	13.6		5.3	23.2		7.3	26.9	
Actuated g/C Ratio	0.08	0.29		0.08	0.23		0.08	0.39		0.12	0.46	
v/c Ratio	0.50	0.29		0.11	0.68		0.38	0.38		0.55	0.46	
Control Delay	42.1	13.6		31.7	24.9		36.0	18.6		39.7	16.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	42.1	13.6		31.7	24.9		36.0	18.6		39.7	16.7	
LOS	D	B		C	C		D	B		D	B	
Approach Delay		22.8			25.3			21.6			22.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	27	26		6	82		21	82		38	96	
Queue Length 95th (ft)	#75	76		23	157		53	151		#99	183	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	142	582		140	520		145	702		188	736	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.50	0.25		0.11	0.58		0.38	0.38		0.55	0.46	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 58.8
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 53.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Avenue 14 & Road 23

2030 No Project AM
20: Ellis Ave & Golden State Blvd 9/12/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.960			0.914			0.890			0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3398	0	3433	3235	0	1752	3119	0	2575	1302	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3398	0	3433	3235	0	1752	3119	0	2575	1302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		63			418			445			50	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	165	374	136	381	303	409	108	150	409	269	106	88
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	36%	36%	36%
Adj. Flow (vph)	179	407	148	414	329	445	117	163	445	292	115	96
Lane Group Flow (vph)	179	555	0	414	774	0	117	608	0	292	211	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	17.0	25.1	0.0	17.0	25.1	0.0	14.0	20.9	0.0	17.0	23.9	0.0
Total Split (%)	21.3%	31.4%	0.0%	21.3%	31.4%	0.0%	17.5%	26.1%	0.0%	21.3%	29.9%	0.0%
Maximum Green (s)	12.1	20.2		12.1	20.2		9.1	16.0		12.1	19.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.0	25.0		14.0	26.0		9.3	12.4		12.5	17.8	
Actuated g/C Ratio	0.16	0.31		0.18	0.32		0.12	0.16		0.16	0.22	
v/c Ratio	0.62	0.50		0.69	0.58		0.57	0.71		0.72	0.64	
Control Delay	41.8	22.8		31.9	7.9		44.8	13.1		43.4	31.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	41.8	22.8		31.9	7.9		44.8	13.1		43.4	31.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C		C	A		D	B		D	C	
Approach Delay		27.4			16.3			18.2			38.3	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	84	112		86	84		56	38		71	75	
Queue Length 95th (ft)	#153	163		m118	m38		107	84		#121	141	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	288	1107		609	1334		219	1010		418	365	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.62	0.50		0.68	0.58		0.53	0.60		0.70	0.58	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 42 (53%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 22.8 Intersection LOS: C
Intersection Capacity Utilization 69.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Ellis Ave & Golden State Blvd

ø1	ø2	ø3	ø4
17 s	20.9 s	17 s	25.1 s

ø5	ø6	ø8	ø7
14 s	23.9 s	25.1 s	17 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.958			0.919			0.883			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	3433	3253	0	1597	2821	0	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	3433	3253	0	1597	2821	0	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			267			479			25	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	202	578	227	817	491	571	191	249	889	407	184	120
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	220	628	247	888	534	621	208	271	966	442	200	130
Lane Group Flow (vph)	220	875	0	888	1155	0	208	1237	0	442	330	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	19.9	33.0	0.0	32.0	45.1	0.0	24.2	37.0	0.0	18.0	30.8	0.0
Total Split (%)	16.6%	27.5%	0.0%	26.7%	37.6%	0.0%	20.2%	30.8%	0.0%	15.0%	25.7%	0.0%
Maximum Green (s)	15.0	28.1		27.1	40.2		19.3	32.1		13.1	25.9	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	15.9	29.0		28.0	41.1		22.4	33.0		14.0	24.6	
Actuated g/C Ratio	0.13	0.24		0.23	0.34		0.19	0.28		0.12	0.20	
v/c Ratio	0.94	1.02		1.11	0.90		0.70	1.31dr		1.10	0.87	
Control Delay	96.3	79.8		88.3	21.2		60.2	84.8		124.3	65.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	96.3	79.8		88.3	21.2		60.2	84.8		124.3	65.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	E		F	C		E	F		F	E	
Approach Delay		83.1			50.3			81.2			99.1	
Approach LOS		F			D			F			F	
Queue Length 50th (ft)	171	~364		~400	202		156	~422		~201	226	
Queue Length 95th (ft)	#325	#496		m#424	m236		#273	#562		#305	#371	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	235	854		801	1290		298	1123		401	411	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.94	1.02		1.11	0.90		0.70	1.10		1.10	0.80	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 42 (35%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.11
Intersection Signal Delay: 72.4 Intersection LOS: E
Intersection Capacity Utilization 107.1% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 20: Ellis Ave & Golden State Blvd

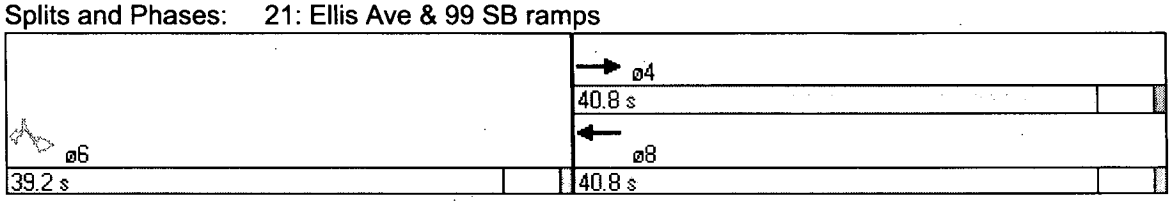
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑					↖		↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												134
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1048	0	0	673	0	0	0	0	344	0	419
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
Heavy Vehicles (%)	3%	3%	3%	14%	14%	14%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	1139	0	0	732	0	0	0	0	374	0	455
Lane Group Flow (vph)	0	1139	0	0	732	0	0	0	0	374	0	455
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	40.8	0.0	0.0	40.8	0.0	0.0	0.0	0.0	39.2	0.0	39.2
Total Split (%)	0.0%	51.0%	0.0%	0.0%	51.0%	0.0%	0.0%	0.0%	0.0%	49.0%	0.0%	49.0%
Maximum Green (s)		35.9			35.9					34.3		34.3
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		47.5			47.5					24.5		24.5
Actuated g/C Ratio		0.59			0.59					0.31		0.31
v/c Ratio		0.55			0.39					0.72		0.81
Control Delay		6.7			5.9					31.7		28.9
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		6.7			5.9					31.7		28.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			A					C		C
Approach Delay		6.7			5.9							
Approach LOS		A			A							
Queue Length 50th (ft)		43			35					167		152
Queue Length 95th (ft)		212			m168					206		212
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2081			1880					749		746
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.55			0.39					0.50		0.61

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 13.7 Intersection LOS: B
Intersection Capacity Utilization 76.5% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑					↰		↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
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
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Flt Permitted										0.950		
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												43
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1874	0	0	1108	0	0	0	0	553	0	771
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	2037	0	0	1204	0	0	0	0	601	0	838
Lane Group Flow (vph)	0	2037	0	0	1204	0	0	0	0	601	0	838
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	64.0	0.0	0.0	64.0	0.0	0.0	0.0	0.0	56.0	0.0	56.0
Total Split (%)	0.0%	53.3%	0.0%	0.0%	53.3%	0.0%	0.0%	0.0%	0.0%	46.7%	0.0%	46.7%
Maximum Green (s)		59.1			59.1					51.1		51.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		60.0			60.0					52.0		52.0
Actuated g/C Ratio		0.50			0.50					0.43		0.43
v/c Ratio		1.15			0.68					0.80		1.20
Control Delay		87.0			10.5					39.1		134.9
Queue Delay		0.0			0.8					0.0		0.0
Total Delay		87.0			11.2					39.1		134.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			B					D		F
Approach Delay		87.0			11.2							
Approach LOS		F			B							
Queue Length 50th (ft)		~972			305					396		~772
Queue Length 95th (ft)		m#847			m192					556		#1020
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		1770			1770					752		697
Starvation Cap Reductn		0			264					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		1.15			0.80					0.80		1.20

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 16 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.20
Intersection Signal Delay: 69.9 Intersection LOS: E
Intersection Capacity Utilization 125.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps

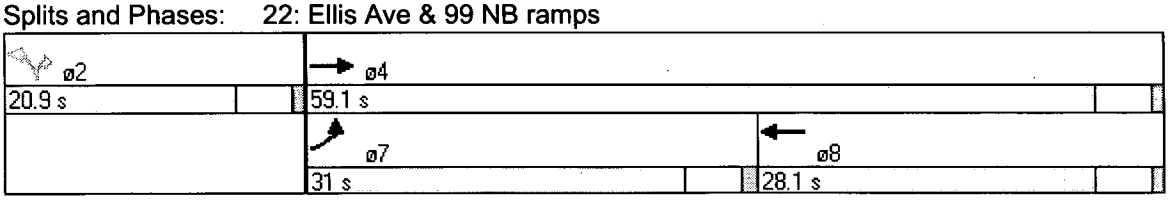
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.941				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1736	3471	0	0	3117	0	3273	0	1509	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1736	3471	0	0	3117	0	3273	0	1509	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					194				322			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	517	510	0	0	544	355	402	0	296	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	9%	9%	9%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	562	554	0	0	591	386	437	0	322	0	0	0
Lane Group Flow (vph)	562	554	0	0	977	0	437	0	322	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	31.0	59.1	0.0	0.0	28.1	0.0	20.9	0.0	20.9	0.0	0.0	0.0
Total Split (%)	38.8%	73.9%	0.0%	0.0%	35.1%	0.0%	26.1%	0.0%	26.1%	0.0%	0.0%	0.0%
Maximum Green (s)	26.1	54.2			23.2		16.0		16.0			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	27.4	56.3			24.9		15.7		15.7			
Actuated g/C Ratio	0.34	0.70			0.31		0.20		0.20			
v/c Ratio	0.94	0.23			0.88		0.68		0.58			
Control Delay	47.0	3.7			32.7		35.5		8.1			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	47.0	3.7			32.7		35.5		8.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			C		D		A			
Approach Delay		25.5			32.7							
Approach LOS		C			C							
Queue Length 50th (ft)	245	39			202		103		0			
Queue Length 95th (ft)	#461	33			#324		150		65			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	595	2443			1104		691		573			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	0.94	0.23			0.88		0.63		0.56			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 27.5 Intersection LOS: C
Intersection Capacity Utilization 76.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
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
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.945				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3312	0	3433	0	1583	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3312	0	3433	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					105				239			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	947	822	0	0	978	560	614	0	455	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1029	893	0	0	1063	609	667	0	495	0	0	0
Lane Group Flow (vph)	1029	893	0	0	1672	0	667	0	495	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	49.0	96.0	0.0	0.0	47.0	0.0	24.0	0.0	24.0	0.0	0.0	0.0
Total Split (%)	40.8%	80.0%	0.0%	0.0%	39.2%	0.0%	20.0%	0.0%	20.0%	0.0%	0.0%	0.0%
Maximum Green (s)	44.1	91.1			42.1		19.1		19.1			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	45.0	92.0			43.0		20.0		20.0			
Actuated g/C Ratio	0.38	0.77			0.36		0.17		0.17			
v/c Ratio	1.55	0.33			1.33		1.17		1.07			
Control Delay	271.1	3.2			186.6		136.7		86.6			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	271.1	3.2			186.6		136.7		86.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	A			F		F		F			
Approach Delay		146.6			186.6							
Approach LOS		F			F							
Queue Length 50th (ft)	~1118	84			~863		~316		~260			
Queue Length 95th (ft)	m#1006	m89			#1004		#435		#474			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	664	2713			1254		572		463			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	1.55	0.33			1.33		1.17		1.07			

Intersection Summary

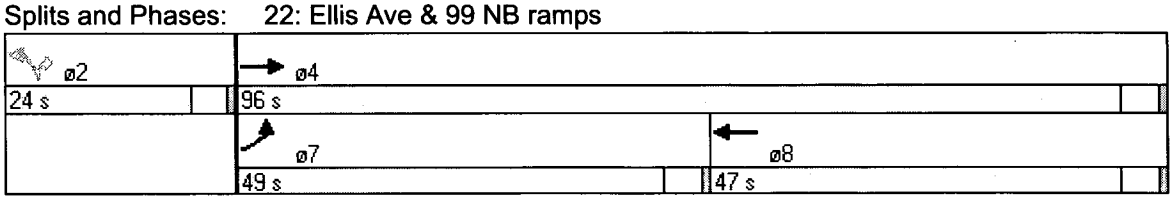
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 96 (80%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.55
Intersection Signal Delay: 153.0 Intersection LOS: F
Intersection Capacity Utilization 125.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



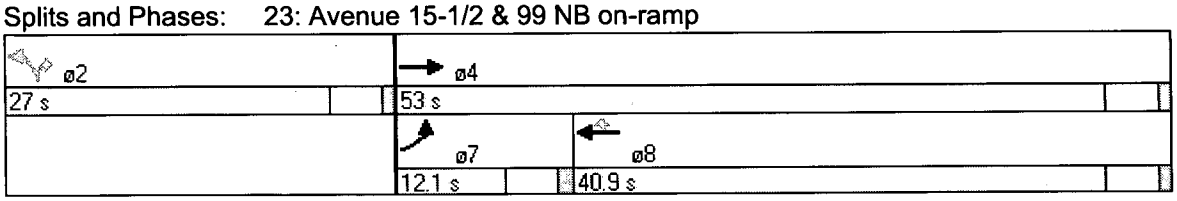
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						455			123			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	280	933	0	0	1299	419	386	0	468	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	304	1014	0	0	1412	455	420	0	509	0	0	0
Lane Group Flow (vph)	304	1014	0	0	1412	455	420	0	509	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	12.1	53.0	0.0	0.0	40.9	40.9	27.0	0.0	27.0	0.0	0.0	0.0
Total Split (%)	15.1%	66.3%	0.0%	0.0%	51.1%	51.1%	33.8%	0.0%	33.8%	0.0%	0.0%	0.0%
Maximum Green (s)	7.5	48.4			36.3	36.3	22.4		22.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	8.1	49.0			36.9	36.9	23.0		23.0			
Actuated g/C Ratio	0.10	0.61			0.46	0.46	0.29		0.29			
v/c Ratio	0.87	0.47			0.88	0.47	0.45		0.98			
Control Delay	59.7	0.3			27.8	3.2	25.2		60.0			
Queue Delay	0.0	0.1			0.1	0.0	0.1		0.0			
Total Delay	59.7	0.4			28.0	3.2	25.3		60.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			C	A	C		E			
Approach Delay		14.1			21.9							
Approach LOS		B			C							
Queue Length 50th (ft)	78	0			323	0	88		200			
Queue Length 95th (ft)	m85	m0			#468	48	129		#403			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	348	2168			1601	961	932		517			
Starvation Cap Reductn	0	297			0	0	0		0			
Spillback Cap Reductn	0	0			10	0	61		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.87	0.54			0.89	0.47	0.48		0.98			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 77 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 24.5 Intersection LOS: C
Intersection Capacity Utilization 85.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						455			4			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	460	2094	0	0	2072	727	794	0	810	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	500	2276	0	0	2252	790	863	0	880	0	0	0
Lane Group Flow (vph)	500	2276	0	0	2252	790	863	0	880	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	14.0	60.0	0.0	0.0	46.0	46.0	40.0	0.0	40.0	0.0	0.0	0.0
Total Split (%)	14.0%	60.0%	0.0%	0.0%	46.0%	46.0%	40.0%	0.0%	40.0%	0.0%	0.0%	0.0%
Maximum Green (s)	9.4	55.4			41.4	41.4	35.4		35.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	10.0	56.0			42.0	42.0	36.0		36.0			
Actuated g/C Ratio	0.10	0.56			0.42	0.42	0.36		0.36			
v/c Ratio	1.46	1.15			1.52	0.85	0.71		1.55			
Control Delay	245.6	77.5			261.6	21.1	31.3		284.0			
Queue Delay	0.0	54.8			10.7	0.0	11.6		0.0			
Total Delay	245.6	132.2			272.3	21.1	42.9		284.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			F	C	D		F			
Approach Delay		152.7			207.0							
Approach LOS		F			F							
Queue Length 50th (ft)	~228	~880			~1059	204	240		~803			
Queue Length 95th (ft)	m#119	m111			#1196	#479	310		#1042			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	343	1982			1486	929	1224		567			
Starvation Cap Reductn	0	192			0	0	0		0			
Spillback Cap Reductn	0	0			23	0	344		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.46	1.27			1.54	0.85	0.98		1.55			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 5 (5%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.55
Intersection Signal Delay: 177.3 Intersection LOS: F
Intersection Capacity Utilization 199.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp

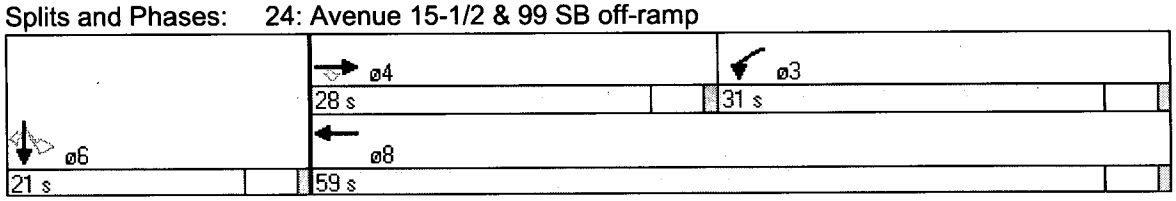
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3539	1583	1736	3471	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			475									98
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	870	437	535	1150	0	0	0	0	343	1	229
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	946	475	582	1250	0	0	0	0	373	1	249
Lane Group Flow (vph)	0	946	475	582	1250	0	0	0	0	0	374	249
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	28.0	28.0	31.0	59.0	0.0	0.0	0.0	0.0	21.0	21.0	21.0
Total Split (%)	0.0%	35.0%	35.0%	38.8%	73.8%	0.0%	0.0%	0.0%	0.0%	26.3%	26.3%	26.3%
Maximum Green (s)		23.4	23.4	26.4	54.4					16.4	16.4	16.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		24.0	24.0	27.0	55.0						17.0	17.0
Actuated g/C Ratio		0.30	0.30	0.34	0.69						0.21	0.21
v/c Ratio		0.89	0.59	0.99	0.52						0.99	0.60
Control Delay		39.0	5.7	47.6	1.6						78.7	23.9
Queue Delay		0.0	0.0	0.0	0.4						0.0	0.0
Total Delay		39.0	5.7	47.6	2.0						78.7	23.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A	D	A						E	C
Approach Delay		27.9			16.5						56.8	
Approach LOS		C			B						E	
Queue Length 50th (ft)		235	0	262	14						188	66
Queue Length 95th (ft)		#347	66	m#411	m36						#359	142
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1062	807	586	2386						377	414
Starvation Cap Reductn		0	0	0	554						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.89	0.59	0.99	0.68						0.99	0.60

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 27.1 Intersection LOS: C
Intersection Capacity Utilization 85.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



2030 No Project PM
24: Avenue 15-1/2 & 99 SB off-ramp 9/12/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.952	
Satd. Flow (prot)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Flt Permitted				0.950							0.952	
Satd. Flow (perm)	0	3539	1583	1770	3539	0	0	0	0	0	1773	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			563									3
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1815	828	487	2379	0	0	0	0	739	1	376
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1973	900	529	2586	0	0	0	0	803	1	409
Lane Group Flow (vph)	0	1973	900	529	2586	0	0	0	0	0	804	409
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	43.0	43.0	22.0	65.0	0.0	0.0	0.0	0.0	35.0	35.0	35.0
Total Split (%)	0.0%	43.0%	43.0%	22.0%	65.0%	0.0%	0.0%	0.0%	0.0%	35.0%	35.0%	35.0%
Maximum Green (s)		38.4	38.4	17.4	60.4					30.4	30.4	30.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		39.0	39.0	18.0	61.0						31.0	31.0
Actuated g/C Ratio		0.39	0.39	0.18	0.61						0.31	0.31
v/c Ratio		1.43	0.94	1.66	1.20						1.46	0.83
Control Delay		225.1	29.2	323.8	105.6						246.8	47.9
Queue Delay		10.9	0.0	0.0	97.1						61.2	0.0
Total Delay		236.0	29.2	323.8	202.7						308.1	47.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	C	F	F						F	D
Approach Delay		171.2			223.3						220.4	
Approach LOS		F			F						F	
Queue Length 50th (ft)		~900	244	~506	~1081						~706	239
Queue Length 95th (ft)		#1038	#559	m#385	m190						#935	#402
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1380	961	319	2159						550	493
Starvation Cap Reductn		0	0	0	331						0	0
Spillback Cap Reductn		23	0	0	0						47	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		1.45	0.94	1.66	1.41						1.60	0.83

Intersection Summary

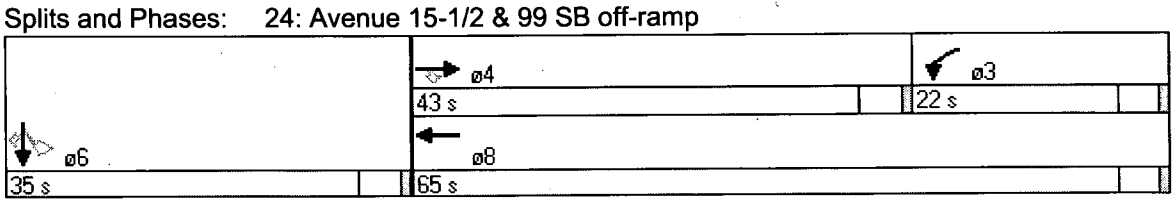
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.66
Intersection Signal Delay: 202.0 Intersection LOS: F
Intersection Capacity Utilization 199.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



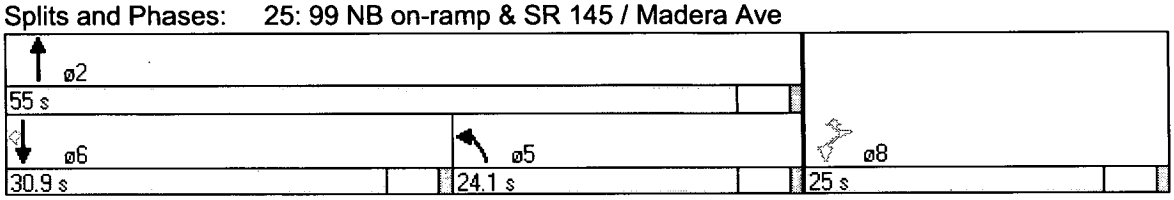
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						53						569
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	678	0	49	654	759	0	0	268	649
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	737	0	53	711	825	0	0	291	705
Lane Group Flow (vph)	0	0	0	737	0	53	711	825	0	0	291	705
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	25.0	0.0	25.0	24.1	55.0	0.0	0.0	30.9	30.9
Total Split (%)	0.0%	0.0%	0.0%	31.3%	0.0%	31.3%	30.1%	68.8%	0.0%	0.0%	38.6%	38.6%
Maximum Green (s)				20.4		20.4	19.5	50.4			26.3	26.3
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				20.4		20.4	23.2	51.6			24.4	24.4
Actuated g/C Ratio				0.26		0.26	0.29	0.64			0.30	0.30
v/c Ratio				0.84		0.12	0.71	0.69			0.51	0.80
Control Delay				38.5		7.8	21.7	5.8			26.9	13.5
Queue Delay				0.0		0.0	0.0	1.3			0.0	0.0
Total Delay				38.5		7.8	21.7	7.1			26.9	13.5
LOS				D		A	C	A			C	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								13.9			17.4	
Approach LOS								B			B	
Queue Length 50th (ft)				178		0	126	84			131	57
Queue Length 95th (ft)				#262		26	m173	m127			183	195
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				908		458	998	1206			645	920
Starvation Cap Reductn				0		0	0	194			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.81		0.12	0.71	0.82			0.45	0.77

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 14 (18%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 20.3 Intersection LOS: C
Intersection Capacity Utilization 66.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



2030 No Project PM
25: 99 NB on-ramp & SR 145 / Madera Ave 9/26/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
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
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						433
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	697	0	67	1069	1062	0	0	449	756
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	758	0	73	1162	1154	0	0	488	822
Lane Group Flow (vph)	0	0	0	758	0	73	1162	1154	0	0	488	822
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	21.0	0.0	21.0	30.0	59.0	0.0	0.0	29.0	29.0
Total Split (%)	0.0%	0.0%	0.0%	26.3%	0.0%	26.3%	37.5%	73.8%	0.0%	0.0%	36.3%	36.3%
Maximum Green (s)				16.4		16.4	25.4	54.4			24.4	24.4
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				17.0		17.0	26.0	55.0			25.0	25.0
Actuated g/C Ratio				0.21		0.21	0.32	0.69			0.31	0.31
v/c Ratio				1.04		0.19	1.04	0.90			0.84	1.04
Control Delay				76.6		8.3	42.5	7.1			40.7	57.7
Queue Delay				0.0		0.0	0.0	46.6			0.0	0.0
Total Delay				76.6		8.3	42.5	53.7			40.7	57.7
LOS				E		A	D	D			D	E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								48.1			51.4	
Approach LOS								D			D	
Queue Length 50th (ft)				~213		0	~321	134			225	~285
Queue Length 95th (ft)				#322		32	m140	m87			#389	#504
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				730		394	1116	1281			582	792
Starvation Cap Reductn				0		0	0	232			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.04		0.19	1.04	1.10			0.84	1.04

Intersection Summary

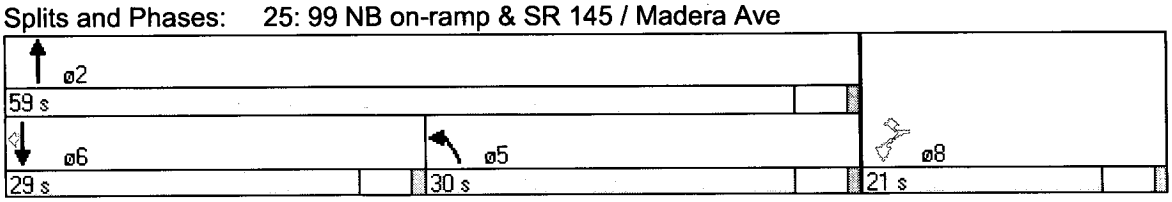
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 59 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 53.2 Intersection LOS: D
Intersection Capacity Utilization 84.0% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						102
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	788	719	0	794	366
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	857	782	0	863	398
Lane Group Flow (vph)	0	857	782	0	863	398
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	39.0	39.0	0.0	41.0	41.0
Total Split (%)	0.0%	48.8%	48.8%	0.0%	51.3%	51.3%
Maximum Green (s)		34.4	34.4		36.4	36.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		35.0	35.0		37.0	37.0
Actuated g/C Ratio		0.44	0.44		0.46	0.46
v/c Ratio		1.05	0.96		1.07	0.51
Control Delay		70.6	30.8		74.3	13.7
Queue Delay		115.7	50.5		2.5	0.0
Total Delay		186.3	81.3		76.9	13.7
LOS		F	F		E	B
Approach Delay		186.3	81.3		56.9	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	F		E	
Queue Length 50th (ft)		~475	221		~484	96
Queue Length 95th (ft)		#691	m#523		#700	174
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		815	815		810	780
Starvation Cap Reductn		0	117		0	0
Spillback Cap Reductn		167	0		5	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.32	1.12		1.07	0.51

Intersection Summary

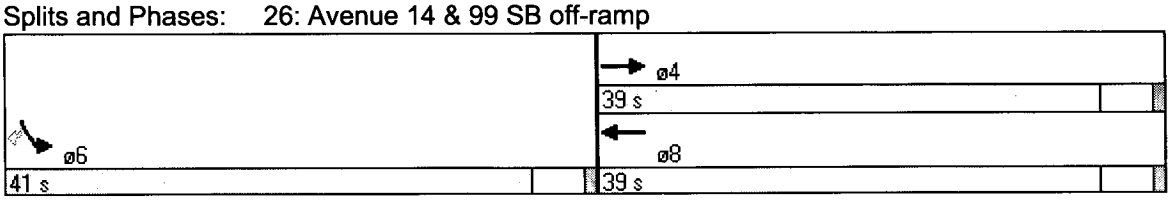
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 12 (15%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 101.7 Intersection LOS: F
Intersection Capacity Utilization 92.1% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						90
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	1112	778	0	1128	299
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1209	846	0	1226	325
Lane Group Flow (vph)	0	1209	846	0	1226	325
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	40.0	40.0	0.0	40.0	40.0
Total Split (%)	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%
Maximum Green (s)		35.4	35.4		35.4	35.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		36.0	36.0		36.0	36.0
Actuated g/C Ratio		0.45	0.45		0.45	0.45
v/c Ratio		1.44	1.01		1.54	0.43
Control Delay		229.3	28.7		271.5	12.6
Queue Delay		123.3	74.2		109.5	0.0
Total Delay		352.6	103.0		381.0	12.6
LOS		F	F		F	B
Approach Delay		352.6	103.0		303.8	
Approach LOS		F	F		F	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		~834	~116		~874	74
Queue Length 95th (ft)		#1072	m346		#1112	139
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		838	838		797	762
Starvation Cap Reductn		0	132		0	0
Spillback Cap Reductn		134	0		109	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.72	1.20		1.78	0.43

Intersection Summary

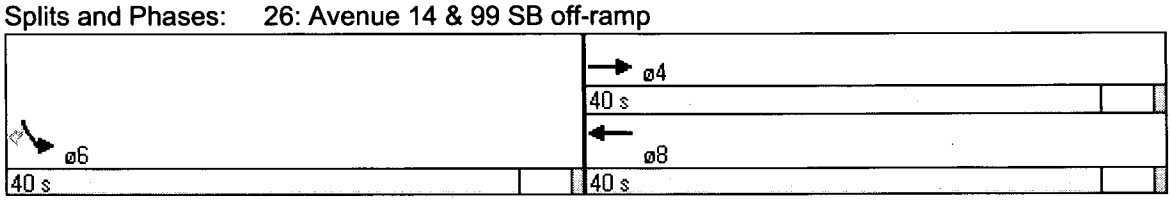
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 63 (79%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.54
Intersection Signal Delay: 273.1 Intersection LOS: F
Intersection Capacity Utilization 127.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.996	
Satd. Flow (prot)	3335	1810	1538	0	0	0	1752	1845	1568	0	3491	1568
Flt Permitted	0.950						0.950				0.583	
Satd. Flow (perm)	3335	1810	1538	0	0	0	1752	1845	1568	0	2043	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			491						98			458
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	379	363	840	0	0	0	298	1034	90	40	485	421
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	412	395	913	0	0	0	324	1124	98	43	527	458
Lane Group Flow (vph)	412	395	913	0	0	0	324	1124	98	0	570	458
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	31.0	31.0	31.0	0.0	0.0	0.0	19.8	49.0	49.0	29.2	29.2	29.2
Total Split (%)	38.8%	38.8%	38.8%	0.0%	0.0%	0.0%	24.8%	61.3%	61.3%	36.5%	36.5%	36.5%
Maximum Green (s)	26.4	26.4	26.4				15.2	44.4	44.4	24.6	24.6	24.6
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	27.0	27.0	27.0				16.5	45.0	45.0		24.5	24.5
Actuated g/C Ratio	0.34	0.34	0.34				0.21	0.56	0.56		0.31	0.31
v/c Ratio	0.37	0.65	1.08				0.90	1.08	0.11		0.91	0.57
Control Delay	20.0	23.1	53.9				61.5	73.4	2.2		31.5	5.3
Queue Delay	47.9	276.7	125.0				3.3	3.9	0.0		0.0	3.8
Total Delay	68.0	299.8	178.9				64.8	77.3	2.2		31.5	9.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	F	F				E	E	A		C	A
Approach Delay		180.1						69.9			21.5	
Approach LOS		F						E			C	
Queue Length 50th (ft)	82	159	~337				161	~639	0		146	5
Queue Length 95th (ft)	m77	m148	m#242				#315	#873	19		m#207	m12
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1126	611	844				361	1038	925		644	808
Starvation Cap Reductn	743	365	177				0	0	0		0	0
Spillback Cap Reductn	0	0	0				12	9	0		0	260
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.08	1.61	1.37				0.93	1.09	0.11		0.89	0.84

Intersection Summary

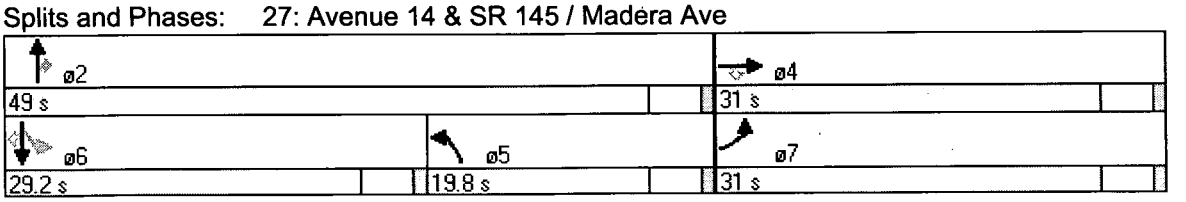
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 102.5 Intersection LOS: F
Intersection Capacity Utilization 98.1% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	F	F				E	E	A		C	A
Approach Delay		180.1						69.9			21.5	
Approach LOS		F						E			C	
Queue Length 50th (ft)	82	159	~337				161	~639	0		146	5
Queue Length 95th (ft)	m77	m148	m#242				#315	#873	19		m#207	m12
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1126	611	844				361	1038	925		644	808
Starvation Cap Reductn	743	365	177				0	0	0		0	0
Spillback Cap Reductn	0	0	0				12	9	0		0	260
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.08	1.61	1.37				0.93	1.09	0.11		0.89	0.84

Intersection Summary

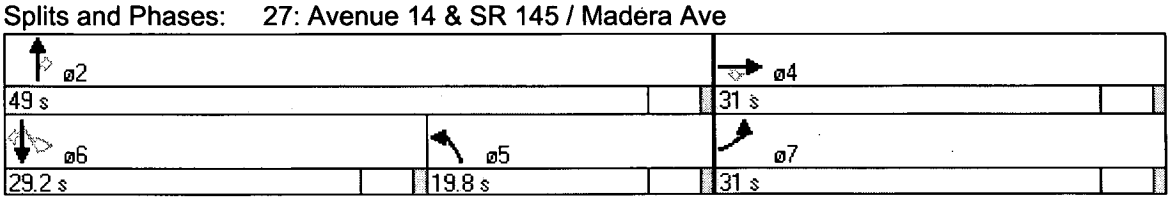
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 102.5 Intersection LOS: F
Intersection Capacity Utilization 98.1% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



2030 No Project PM
27: Avenue 14 & SR 145 / Madera Ave 9/26/2006

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.994	
Satd. Flow (prot)	3367	1827	1553	0	0	0	1770	1863	1583	0	3518	1583
Flt Permitted	0.950						0.950				0.609	
Satd. Flow (perm)	3367	1827	1553	0	0	0	1770	1863	1583	0	2155	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			361						60			475
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	465	547	1228	0	0	0	341	1666	96	82	627	437
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	505	595	1335	0	0	0	371	1811	104	89	682	475
Lane Group Flow (vph)	505	595	1335	0	0	0	371	1811	104	0	771	475
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	34.0	34.0	34.0	0.0	0.0	0.0	15.0	46.0	46.0	31.0	31.0	31.0
Total Split (%)	42.5%	42.5%	42.5%	0.0%	0.0%	0.0%	18.8%	57.5%	57.5%	38.8%	38.8%	38.8%
Maximum Green (s)	29.4	29.4	29.4				10.4	41.4	41.4	26.4	26.4	26.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	30.0	30.0	30.0				11.0	42.0	42.0		27.0	27.0
Actuated g/C Ratio	0.38	0.38	0.38				0.14	0.52	0.52		0.34	0.34
v/c Ratio	0.40	0.87	1.65				1.53	1.85	0.12		1.06	0.56
Control Delay	17.1	24.5	312.9				285.5	407.7	5.2		68.7	15.3
Queue Delay	150.2	544.2	251.1				143.1	0.0	0.0		0.0	0.7
Total Delay	167.3	568.7	563.9				428.5	407.7	5.2		68.7	16.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F	F				F	F	A		E	B
Approach Delay		482.9						392.8			48.6	
Approach LOS		F						F			D	
Queue Length 50th (ft)	86	258	~988				~263	~1396	10		~237	144
Queue Length 95th (ft)	m54	m146	m#415				#427	#1652	33		m#262	m146
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1263	685	808				243	978	860		727	849
Starvation Cap Reductn	881	416	204				0	0	0		0	0
Spillback Cap Reductn	0	0	0				42	0	0		0	141
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.32	2.21	2.21				1.85	1.85	0.12		1.06	0.67

Intersection Summary

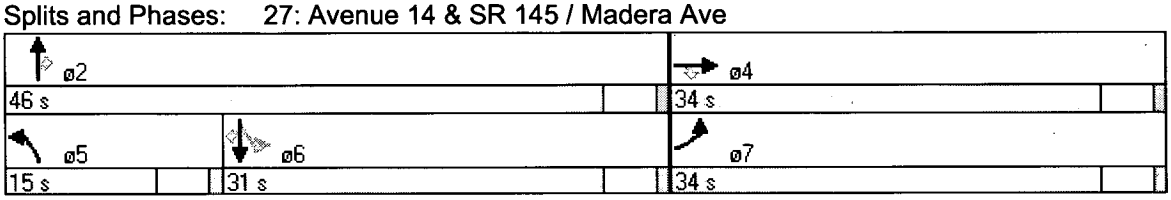
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.85
Intersection Signal Delay: 357.7 Intersection LOS: F
Intersection Capacity Utilization 146.2% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description 04-837.1	
East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	394			274	225
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	71	447	0	0	311	255
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						250
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	284
Percent Heavy Vehicles	0	0	0	0	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	71							284
C (m) (veh/h)	853							573
v/c	0.08							0.50
95% queue length	0.27							2.74
Control Delay (s/veh)	9.6							17.3
LOS	A							C
Approach Delay (s/veh)	–	–				17.3		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 8/30/2006 6:37 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description 04-837.1	
East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	542			409	263
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	615	0	0	464	298
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						280
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	318
Percent Heavy Vehicles	0	0	0	0	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	82							318
C (m) (veh/h)	723							482
v/c	0.11							0.66
95% queue length	0.38							4.73
Control Delay (s/veh)	10.6							25.8
LOS	B							D
Approach Delay (s/veh)	–	–				25.8		
Approach LOS	–	–				D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 8/30/2006 6:38 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Godlen State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	40	50	412	51	115
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	45	56	468	57	130
Percent Heavy Vehicles	8	–	–	46	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	29	77	219	111	43	4
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	32	87	248	126	48	4
Percent Heavy Vehicles	20	20	20	79	79	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	468		367			178	
C (m) (veh/h)	1352	1257		215			16	
v/c	0.00	0.37		1.71			11.13	
95% queue length	0.01	1.75		24.60			23.14	
Control Delay (s/veh)	7.7	9.6		376.2			5021	
LOS	A	A		F			F	
Approach Delay (s/veh)	–	–	376.2			5021		
Approach LOS	–	–	F			F		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 8/30/2006 5:02 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description 04-837.1

East/West Street: Avenue 18 1/2	North/South Street: Golden State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	12	90	74	530	100	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	13	102	84	602	113	144
Percent Heavy Vehicles	5	–	–	49	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	39	87	344	127	60	5
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	44	98	390	144	68	5
Percent Heavy Vehicles	20	20	20	48	48	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	13	602		532			217	
C (m) (veh/h)	1290	1150		0			0	
v/c	0.01	0.52						
95% queue length	0.03	3.15						
Control Delay (s/veh)	7.8	11.5						
LOS	A	B		F			F	
Approach Delay (s/veh)	–	–						
Approach LOS	–	–						

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 4:56 PM

ATTACHMENT VI – C - 25

2030 NO PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A/B/C

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/12/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR-99 NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

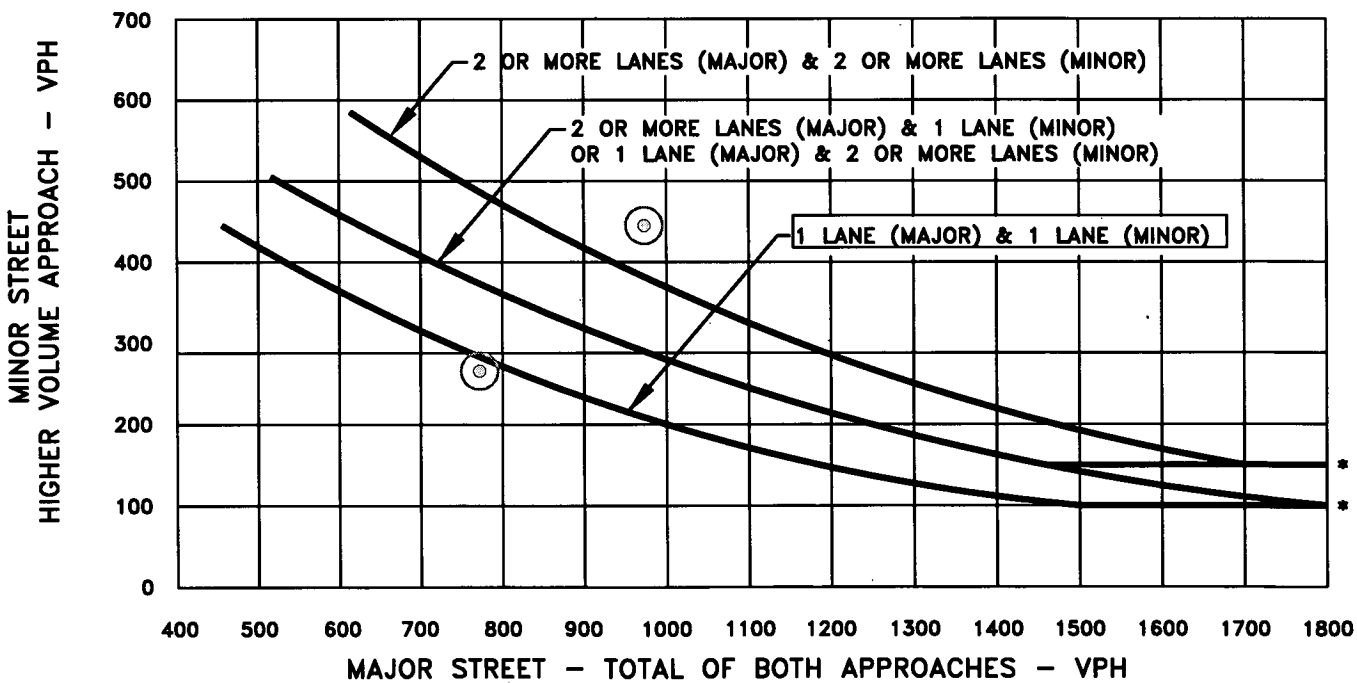
CONDITION: 2030 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		772	973			
Highest Approaches – Minor Street	✓		266	445			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

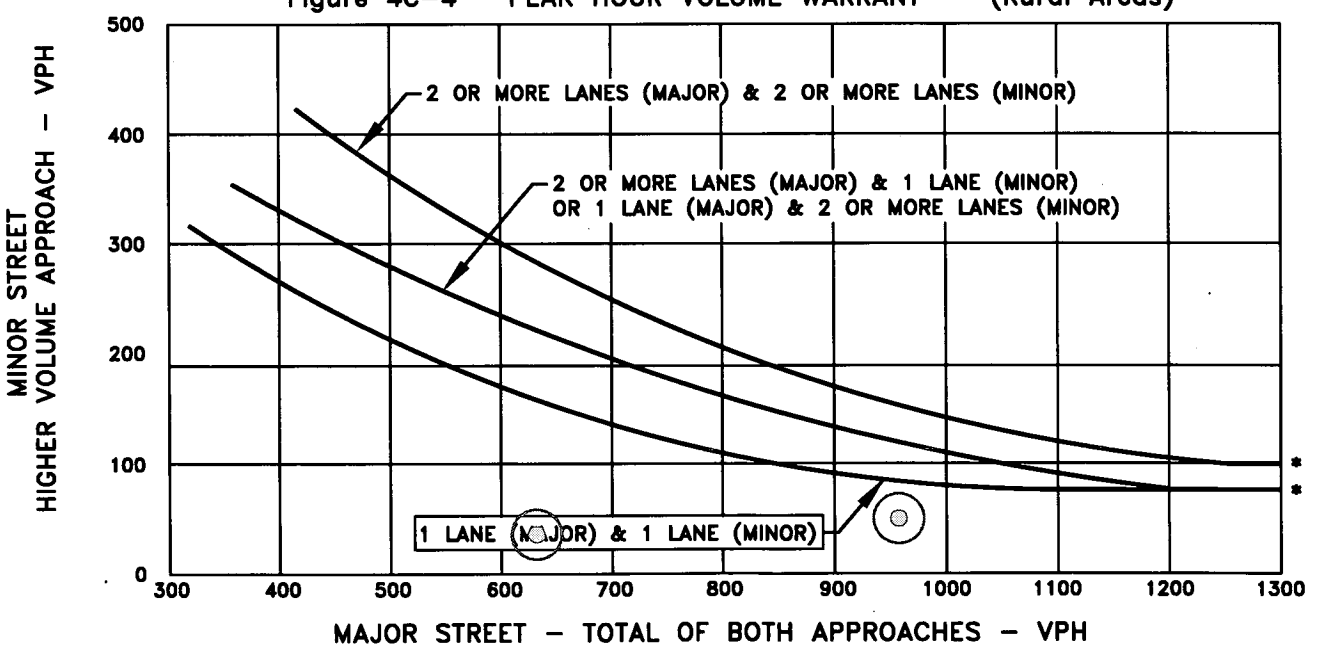
CONDITION: 2030 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		632	957				
Highest Approaches – Minor Street	✓		36	50				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 15 1/2 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ]

[ ] URBAN (U)

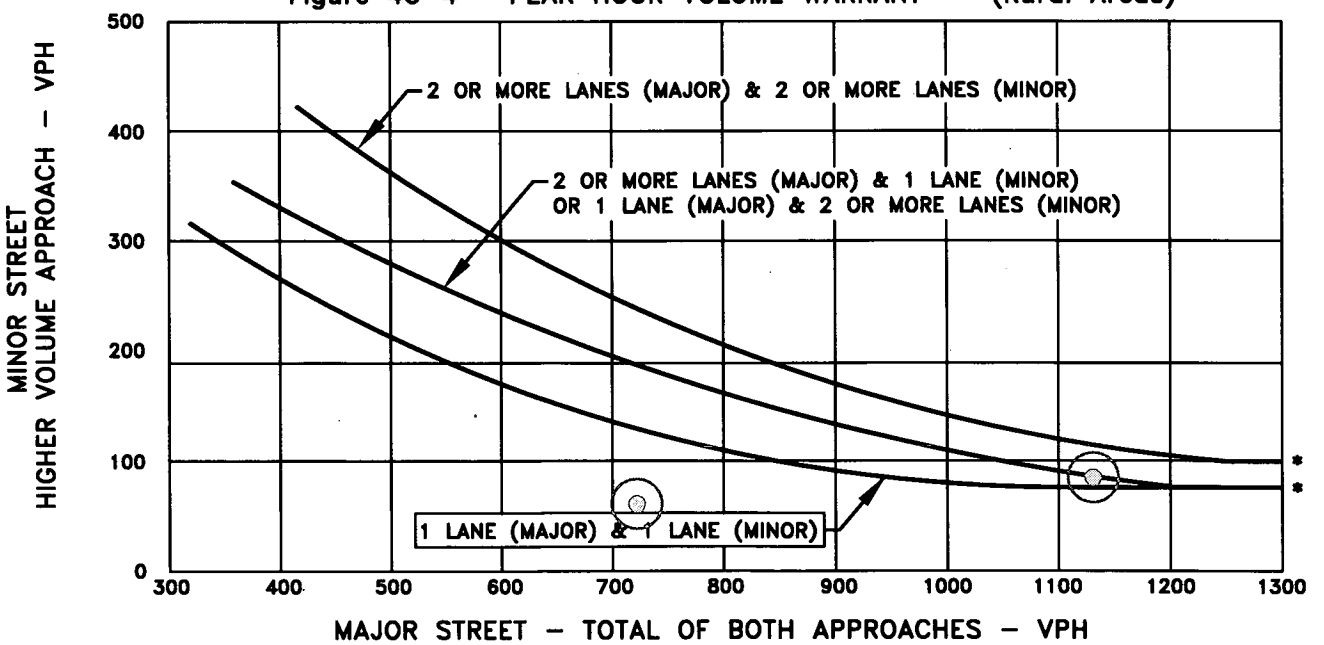
CONDITION: 2030 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		722	1131				
Highest Approaches – Minor Street	✓		61	85				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: SR-99 NB RAMPS Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

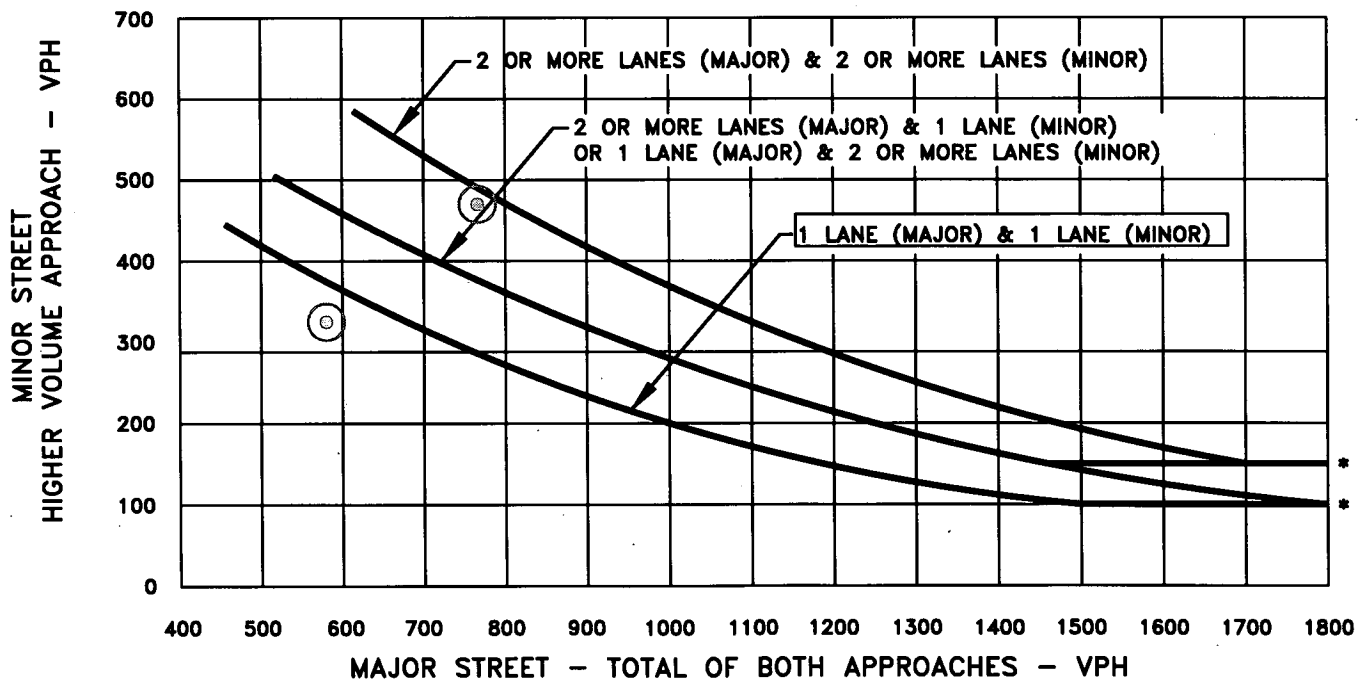
CONDITION: 2030 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		580	766			
Highest Approaches – Minor Street	✓		325	470			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 9/8/06 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: PISTACHIO DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

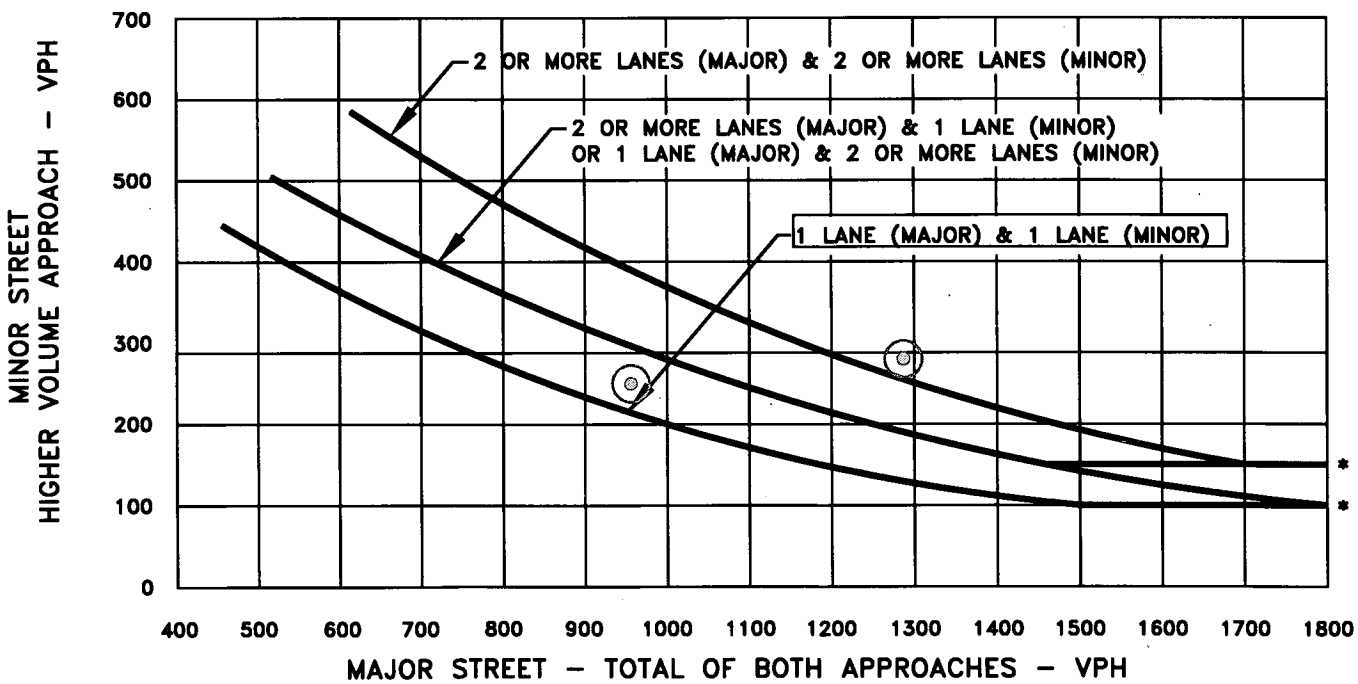
CONDITION: 2030 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		956	1287			
Highest Approaches – Minor Street	✓		250	280			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: AVENUE 18 1/2 Critical Approach Speed 35 mph

MINOR STREET: GOLDEN STATE BLVD / ROAD 23 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

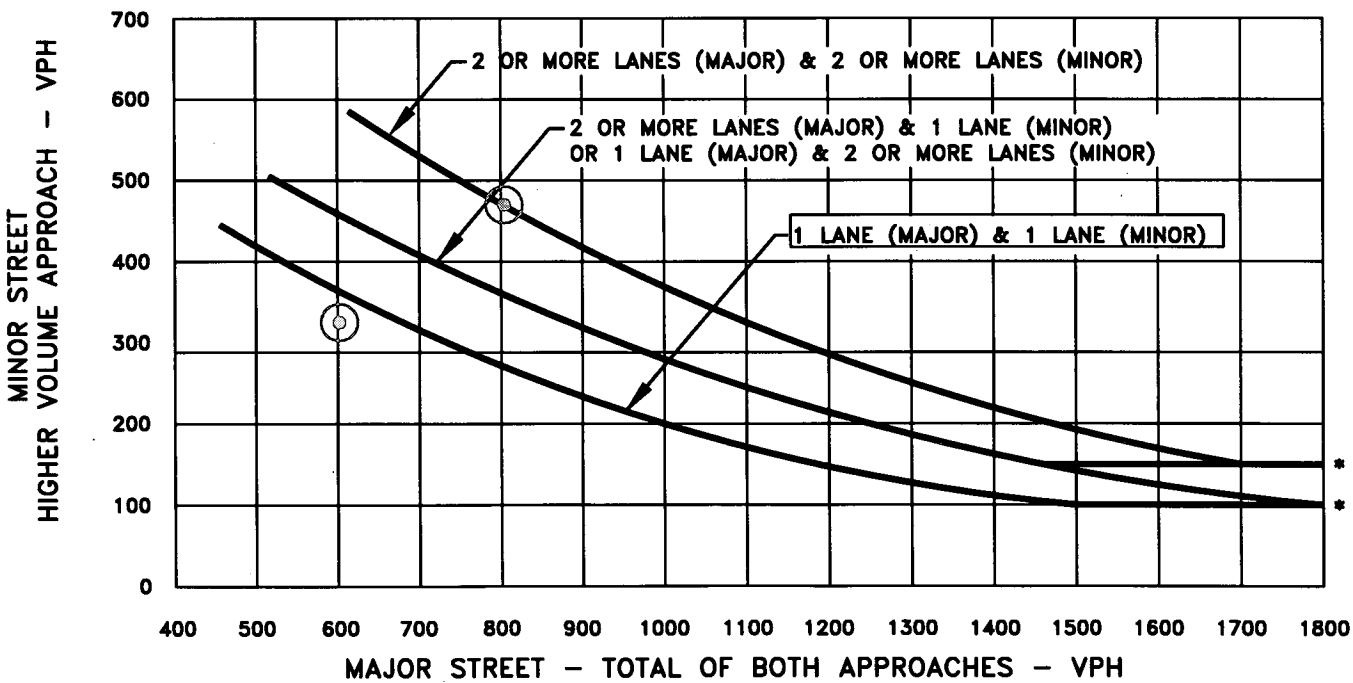
CONDITION: 2030 NO/"0" PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		602	804			
Highest Approaches – Minor Street	✓		325	470			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

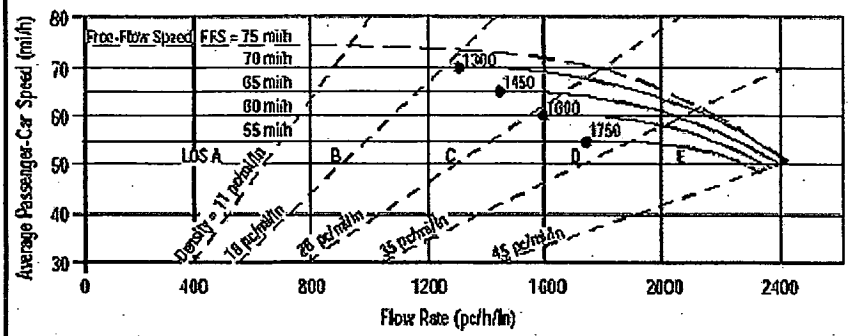
ATTACHMENT VI – C - 26

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4266*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

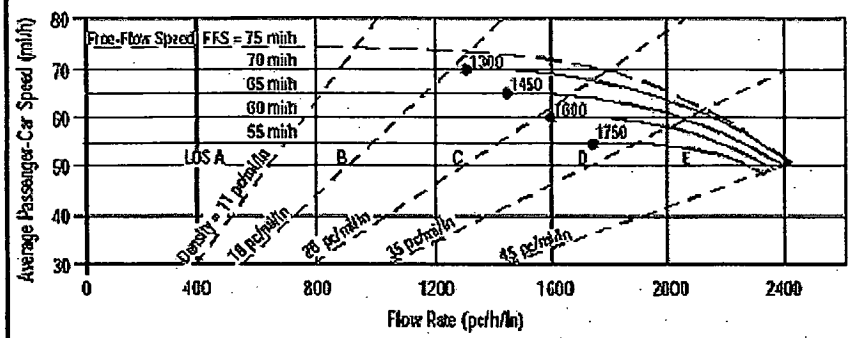
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1737*	pc/h/ln	Design LOS		
S	*68.5*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*25.4*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4418*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1799*	pc/h/ln
S	*67.9*	mi/h
D = v_p / S	*26.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

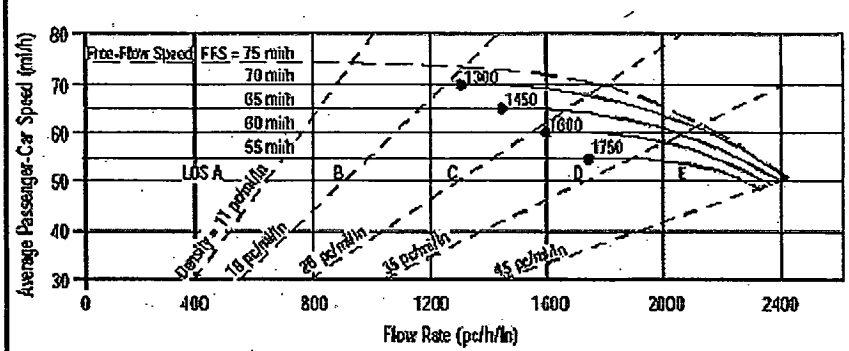
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3539*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

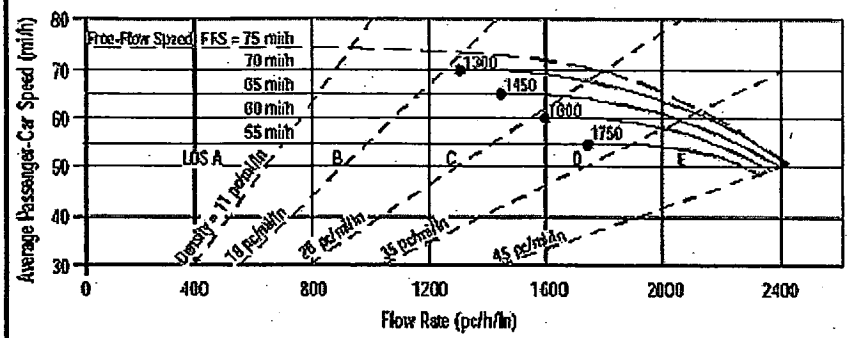
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1441*	pc/h/ln	Design LOS	
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*20.6*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5356*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

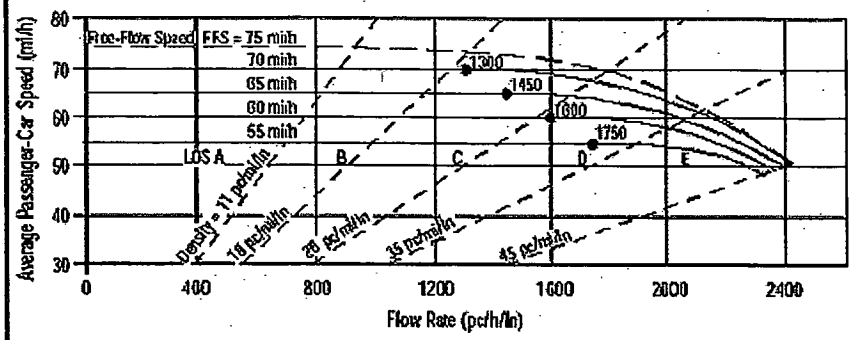
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2181*	pc/h/ln	Design LOS	
S	*60.6*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*36.0*	pc/mi/ln	S	mi/h
LOS	*E*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4635*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1888*	pc/h/ln
S	*66.7*	mi/h
D = v_p / S	*28.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

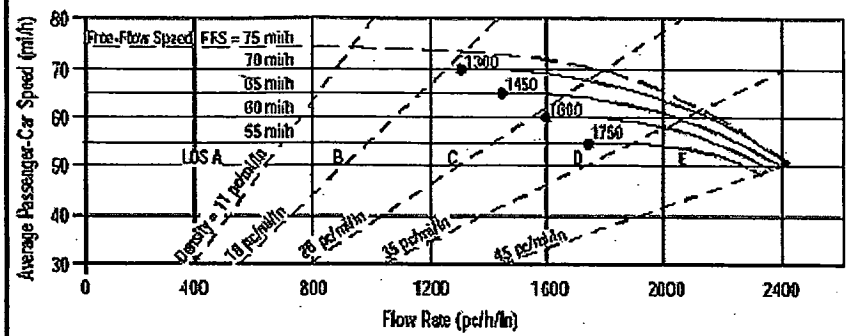
N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2030 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4699*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1914*	pc/h/ln
S	*66.3*	mi/h
D = v_p / S	*28.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

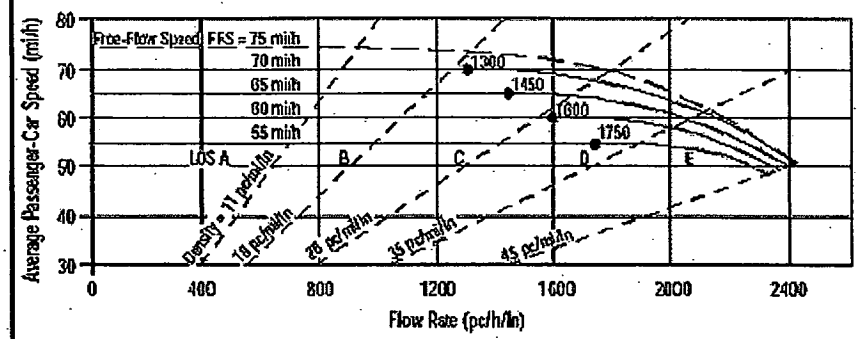
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3793*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

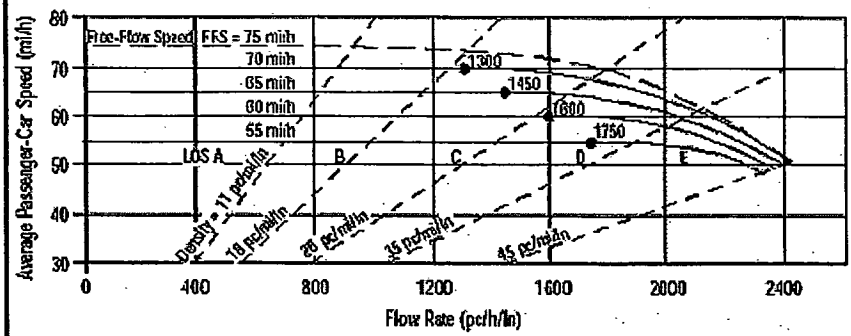
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1545*	pc/h/ln	Design LOS		
S	*69.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*22.2*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved.

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5733*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

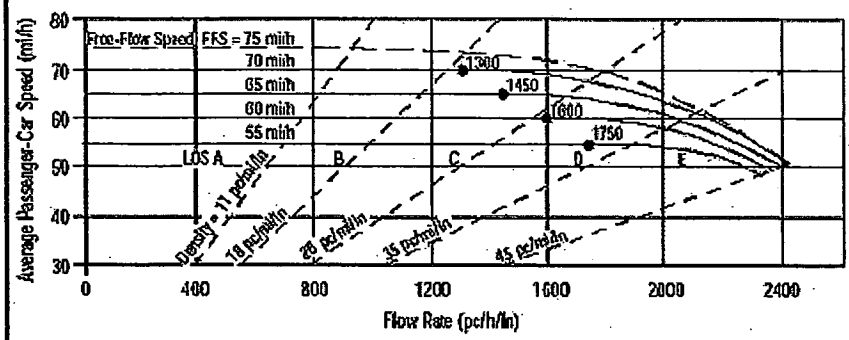
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2335*	pc/h/ln	Design LOS		
S	*55.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*41.9*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5419*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

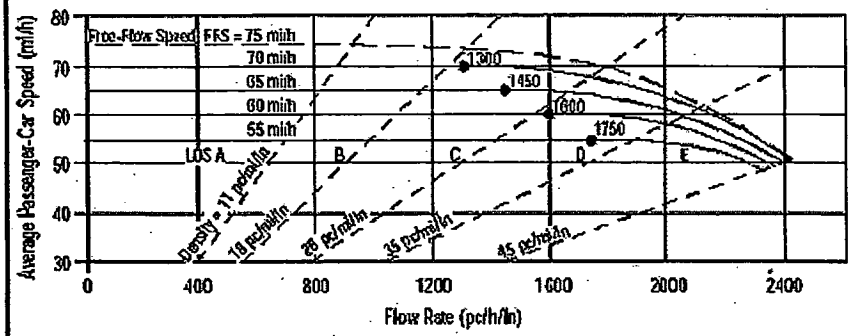
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2207*	pc/h/ln	Design LOS		
S	*59.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*36.8*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6423*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

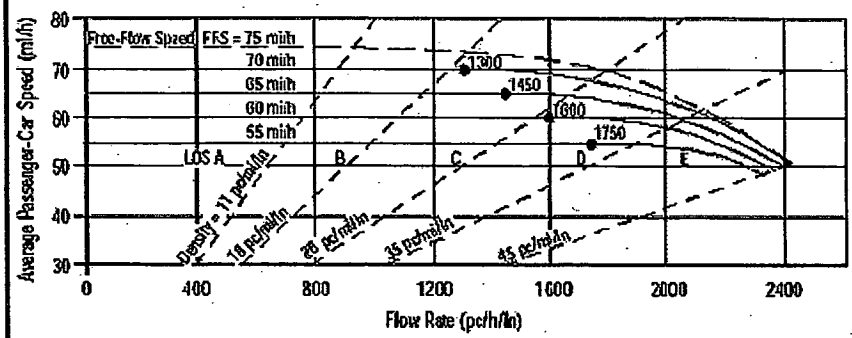
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2616*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4092*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

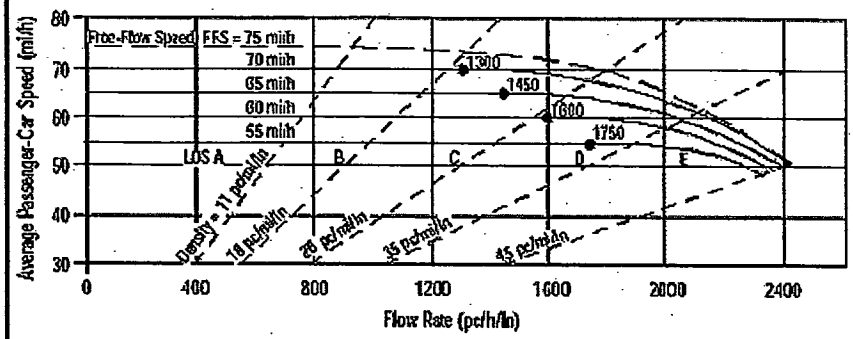
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1250*	pc/h/ln	Design LOS	
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*17.9*	pc/mi/ln	S	mi/h
LOS	*B*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2030 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7116*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2173*	pc/h/ln
S	*60.9*	mi/h
D = v_p / S	*35.7*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 27

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.880	
Flt Protected					0.995	
Satd. Flow (prot)	0	1473	1557	0	1214	0
Flt Permitted					0.995	
Satd. Flow (perm)	0	1473	1557	0	1214	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					319	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	507	301	0	34	281
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	576	342	0	39	319
Lane Group Flow (vph)	0	576	342	0	358	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	44.0	44.0	0.0	26.0	0.0
Total Split (%)	0.0%	62.9%	62.9%	0.0%	37.1%	0.0%
Maximum Green (s)		39.4	39.4		21.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		40.0	40.0		22.0	
Actuated g/C Ratio		0.57	0.57		0.31	
v/c Ratio		0.68	0.38		0.60	
Control Delay		15.8	2.1		8.4	
Queue Delay		0.0	0.0		0.0	
Total Delay		15.8	2.1		8.4	
LOS		B	A		A	
Approach Delay		15.8	2.1		8.4	
Approach LOS		B	A		A	
90th %ile Green (s)		39.4	39.4		21.4	
90th %ile Term Code		Coord	Coord		MaxR	

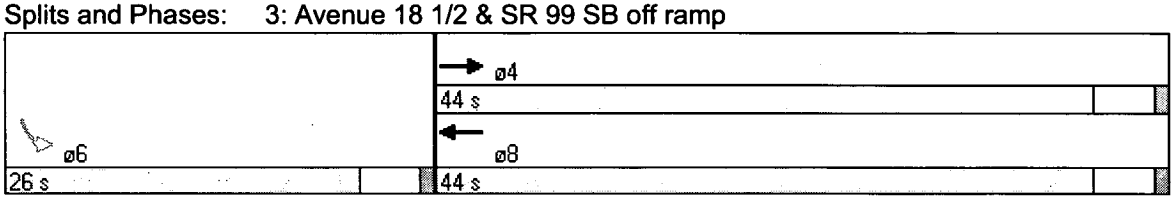
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		39.4	39.4		21.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		39.4	39.4		21.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		39.4	39.4		21.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		39.4	39.4		21.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		158	7		12	
Queue Length 95th (ft)		260	m11		74	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		842	890		600	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.68	0.38		0.60	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 57 (81%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 10.1 Intersection LOS: B
Intersection Capacity Utilization 52.6% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.882	
Flt Protected					0.994	
Satd. Flow (prot)	0	1473	1557	0	1216	0
Flt Permitted					0.994	
Satd. Flow (perm)	0	1473	1557	0	1216	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					435	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	699	352	0	65	441
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	794	400	0	74	501
Lane Group Flow (vph)	0	794	400	0	575	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	52.0	52.0	0.0	28.0	0.0
Total Split (%)	0.0%	65.0%	65.0%	0.0%	35.0%	0.0%
Maximum Green (s)		47.4	47.4		23.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		48.0	48.0		24.0	
Actuated g/C Ratio		0.60	0.60		0.30	
v/c Ratio		0.90	0.43		0.86	
Control Delay		29.7	2.0		21.9	
Queue Delay		0.0	0.0		0.0	
Total Delay		29.7	2.0		21.9	
LOS		C	A		C	
Approach Delay		29.7	2.0		21.9	
Approach LOS		C	A		C	
90th %ile Green (s)		47.4	47.4		23.4	
90th %ile Term Code		Coord	Coord		MaxR	

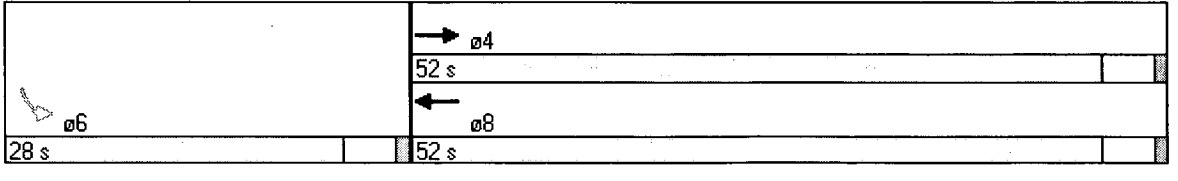
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		47.4	47.4		23.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		47.4	47.4		23.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		47.4	47.4		23.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		47.4	47.4		23.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		311	5		58	
Queue Length 95th (ft)		#560	m19		#260	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		884	934		669	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.90	0.43		0.86	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 13 (16%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 20.9 Intersection LOS: C
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.961				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1220	1284	0	0	1675	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1220	1284	0	0	1675	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28				21			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	259	85	0	0	119	48	243	0	36	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	294	97	0	0	135	55	276	0	41	0	0	0
Lane Group Flow (vph)	294	97	0	0	190	0	0	276	41	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	26.1	47.0	0.0	0.0	20.9	0.0	23.0	23.0	23.0	0.0	0.0	0.0
Total Split (%)	37.3%	67.1%	0.0%	0.0%	29.9%	0.0%	32.9%	32.9%	32.9%	0.0%	0.0%	0.0%
Maximum Green (s)	21.5	42.4			16.3		18.4	18.4	18.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	22.1	44.6			18.5			17.4	17.4			
Actuated g/C Ratio	0.32	0.64			0.26			0.25	0.25			
v/c Ratio	0.76	0.12			0.41			0.83	0.13			
Control Delay	23.9	2.1			22.0			47.1	13.4			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	23.9	2.1			22.0			47.1	13.4			

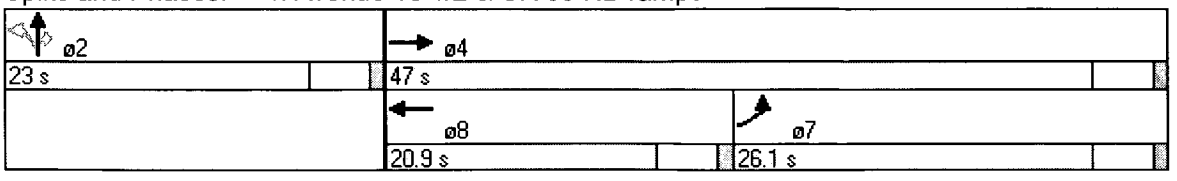
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		18.5			22.0			42.7				
Approach LOS		B			C			D				
90th %ile Green (s)	21.5	42.4			16.3		18.4	18.4	18.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	21.5	42.4			16.3		18.4	18.4	18.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	21.5	42.4			16.3		18.4	18.4	18.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	21.5	44.1			18.0		16.7	16.7	16.7			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	21.5	48.6			22.5		12.2	12.2	12.2			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	113	4			59			109	6			
Queue Length 95th (ft)	m#211	m6			112			#214	28			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	385	818			463			363	340			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.76	0.12			0.41			0.76	0.12			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.8 Intersection LOS: C
Intersection Capacity Utilization 52.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



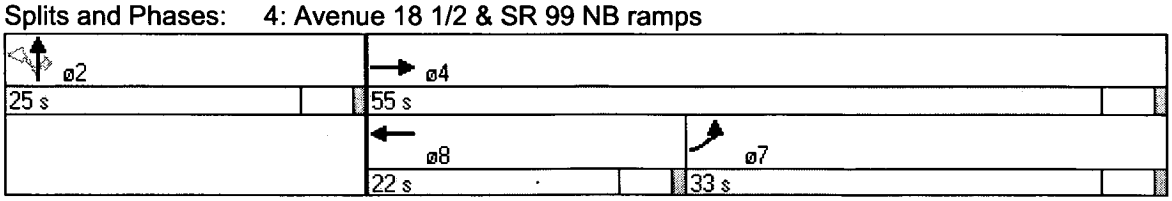
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.977				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1480	1557	0	0	1614	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1480	1557	0	0	1614	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					12				34			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	390	123	0	0	173	35	281	0	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	443	140	0	0	197	40	319	0	89	0	0	0
Lane Group Flow (vph)	443	140	0	0	237	0	0	319	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	33.0	55.0	0.0	0.0	22.0	0.0	25.0	25.0	25.0	0.0	0.0	0.0
Total Split (%)	41.3%	68.8%	0.0%	0.0%	27.5%	0.0%	31.3%	31.3%	31.3%	0.0%	0.0%	0.0%
Maximum Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	29.0	52.3			19.3			19.7	19.7			
Actuated g/C Ratio	0.36	0.65			0.24			0.25	0.25			
v/c Ratio	0.82	0.14			0.60			0.86	0.25			
Control Delay	19.3	1.0			33.3			52.1	17.6			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	19.3	1.0			33.3			52.1	17.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	A			C			D	B			
Approach Delay		14.9			33.3			44.6				
Approach LOS		B			C			D				
90th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	28.4	51.2			18.2		19.6	19.6	19.6			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	28.4	56.0			23.0		14.8	14.8	14.8			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	172	3			102			149	21			
Queue Length 95th (ft)	m180	m4			172			#271	56			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	537	1018			398			395	378			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.82	0.14			0.60			0.81	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 28 (35%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 28.3 Intersection LOS: C
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



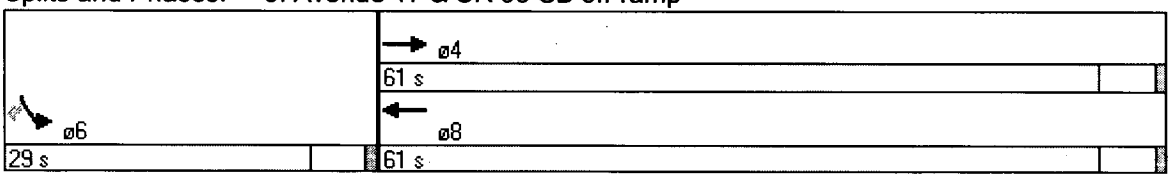
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3374	3505	0	1703	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	3374	3505	0	1703	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1479	1576	0	155	244
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	1681	1791	0	176	277
Lane Group Flow (vph)	0	1681	1791	0	176	277
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	61.0	61.0	0.0	29.0	29.0
Total Split (%)	0.0%	67.8%	67.8%	0.0%	32.2%	32.2%
Maximum Green (s)		55.7	55.7		23.7	23.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		61.6	61.6		20.4	20.4
Actuated g/C Ratio		0.68	0.68		0.23	0.23
v/c Ratio		0.73	0.75		0.46	0.76
Control Delay		3.5	4.7		33.0	43.3
Queue Delay		0.3	0.0		0.0	0.0
Total Delay		3.8	4.7		33.0	43.3
LOS		A	A		C	D
Approach Delay		3.8	4.7		39.3	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		D	
Queue Length 50th (ft)		45	216		86	134
Queue Length 95th (ft)		73	m240		135	205
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2310	2400		473	440
Starvation Cap Reductn		175	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.79	0.75		0.37	0.63

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 63 (70%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 8.3 Intersection LOS: A
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3343	0	1671	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3343	0	1671	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						6
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	2966	2372	0	334	347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	3370	2695	0	380	394
Lane Group Flow (vph)	0	3370	2695	0	380	394
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	90.0	90.0	0.0	30.0	30.0
Total Split (%)	0.0%	75.0%	75.0%	0.0%	25.0%	25.0%
Maximum Green (s)		84.7	84.7		24.7	24.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		86.0	86.0		26.0	26.0
Actuated g/C Ratio		0.72	0.72		0.22	0.22
v/c Ratio		1.35	1.12		1.05	1.20
Control Delay		179.5	68.3		106.6	155.2
Queue Delay		26.0	83.7		0.0	1.6
Total Delay		205.5	152.0		106.6	156.7
LOS		F	F		F	F
Approach Delay		205.5	152.0		132.1	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	F		F	
Queue Length 50th (ft)		~1779	~1263		~321	~368
Queue Length 95th (ft)		m353	m256		#496	#548
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2488	2396		362	329
Starvation Cap Reductn		102	28		0	0
Spillback Cap Reductn		0	343		0	1
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.41	1.31		1.05	1.20

Intersection Summary

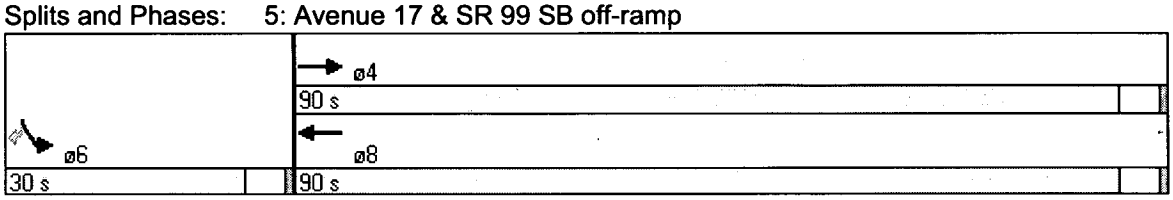
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.35
Intersection Signal Delay: 176.1 Intersection LOS: F
Intersection Capacity Utilization 112.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



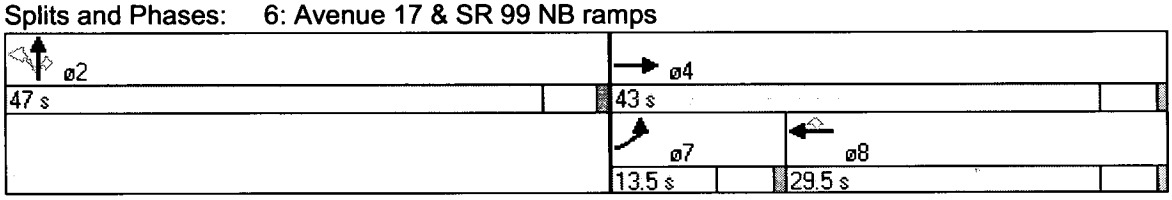
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.955				
Satd. Flow (prot)	1752	3505	0	0	3539	1583	1681	1690	2787	0	0	0
Flt Permitted	0.950						0.950	0.955				
Satd. Flow (perm)	1752	3505	0	0	3539	1583	1681	1690	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						81			434			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	146	411	0	0	793	71	1299	47	382	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	166	467	0	0	901	81	1476	53	434	0	0	0
Lane Group Flow (vph)	166	467	0	0	901	81	745	784	434	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	13.5	43.0	0.0	0.0	29.5	29.5	47.0	47.0	47.0	0.0	0.0	0.0
Total Split (%)	15.0%	47.8%	0.0%	0.0%	32.8%	32.8%	52.2%	52.2%	52.2%	0.0%	0.0%	0.0%
Maximum Green (s)	8.2	37.7			24.2	24.2	41.7	41.7	41.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.5	39.0			25.5	25.5	43.0	43.0	43.0			
Actuated g/C Ratio	0.11	0.43			0.28	0.28	0.48	0.48	0.48			
v/c Ratio	0.90	0.31			0.90	0.16	0.93	0.97	0.28			
Control Delay	71.0	11.3			44.3	6.8	42.1	50.2	1.9			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	71.0	11.3			44.3	6.8	42.1	50.2	1.9			
LOS	E	B			D	A	D	D	A			
Approach Delay		27.0			41.2			36.4				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			D			D				
Queue Length 50th (ft)	86	75			258	0	401	438	0			
Queue Length 95th (ft)	m#165	114			#355	31	#634	#682	23			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	185	1519			1003	507	803	807	1558			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.90	0.31			0.90	0.16	0.93	0.97	0.28			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 32 (36%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 36.1 Intersection LOS: D
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						161			76			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	220	1021	0	0	1400	236	1854	5	1379	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	250	1160	0	0	1591	268	2107	6	1567	0	0	0
Lane Group Flow (vph)	250	1160	0	0	1591	268	1054	1059	1567	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	17.0	62.0	0.0	0.0	45.0	45.0	58.0	58.0	58.0	0.0	0.0	0.0
Total Split (%)	14.2%	51.7%	0.0%	0.0%	37.5%	37.5%	48.3%	48.3%	48.3%	0.0%	0.0%	0.0%
Maximum Green (s)	11.7	56.7			39.7	39.7	52.7	52.7	52.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	13.0	58.0			41.0	41.0	54.0	54.0	54.0			
Actuated g/C Ratio	0.11	0.48			0.34	0.34	0.45	0.45	0.45			
v/c Ratio	1.30	0.68			1.32	0.41	1.39	1.40	1.21			
Control Delay	177.7	17.9			181.9	13.9	214.6	215.0	131.4			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	177.7	17.9			181.9	13.9	214.6	215.0	131.4			
LOS	F	B			F	B	F	F	F			
Approach Delay		46.2			157.7			179.3				
Approach LOS		D			F			F				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	~248	286			~836	58	~1146	~1153	~826			
Queue Length 95th (ft)	m147	m186			#942	127	#1368	#1375	#943			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	192	1711			1209	647	756	759	1296			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	1.30	0.68			1.32	0.41	1.39	1.40	1.21			

Intersection Summary

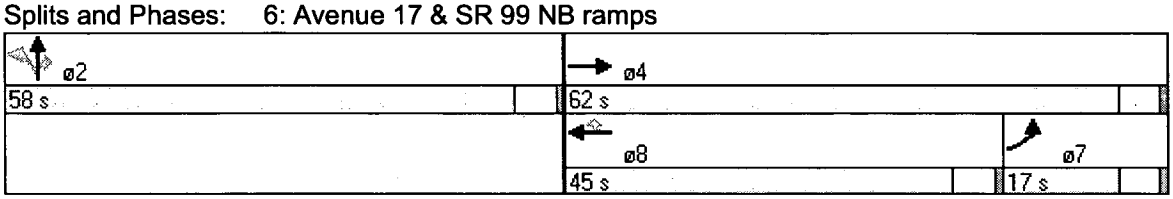
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 106 (88%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.40
Intersection Signal Delay: 146.5 Intersection LOS: F
Intersection Capacity Utilization 112.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



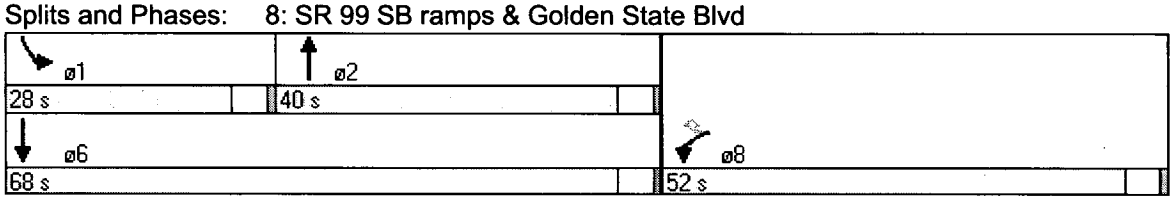
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.889			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1626	1455	1656	0	1770	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1626	1455	1656	0	1770	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		308	196			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	534	299	89	407	276	87
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	607	340	101	462	314	99
Lane Group Flow (vph)	607	340	563	0	314	99
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	52.0	52.0	40.0	0.0	28.0	68.0
Total Split (%)	43.3%	43.3%	33.3%	0.0%	23.3%	56.7%
Maximum Green (s)	47.4	47.4	35.4		23.4	63.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	47.2	47.2	37.3		23.6	64.8
Actuated g/C Ratio	0.39	0.39	0.31		0.20	0.54
v/c Ratio	0.95	0.45	0.87		0.90	0.10
Control Delay	60.9	5.9	13.0		76.6	14.2
Queue Delay	16.3	0.0	30.0		0.0	0.0
Total Delay	77.2	5.9	43.1		76.6	14.2
LOS	E	A	D		E	B
Approach Delay	51.6		43.1			61.6

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	D		D			E
Queue Length 50th (ft)	444	15	155		239	36
Queue Length 95th (ft)	#653	72	m110		#387	63
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	656	771	658		358	1014
Starvation Cap Reductn	0	0	120		0	0
Spillback Cap Reductn	59	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.02	0.44	1.05		0.88	0.10

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 51.2 Intersection LOS: D
Intersection Capacity Utilization 84.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	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
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.892			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1538	1662	0	1641	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1538	1662	0	1641	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		480	166			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	957	778	143	560	350	131
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	1088	884	162	636	398	149
Lane Group Flow (vph)	1088	884	798	0	398	149
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	57.0	57.0	39.0	0.0	24.0	63.0
Total Split (%)	47.5%	47.5%	32.5%	0.0%	20.0%	52.5%
Maximum Green (s)	52.4	52.4	34.4		19.4	58.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	53.0	53.0	35.0		20.0	59.0
Actuated g/C Ratio	0.44	0.44	0.29		0.17	0.49
v/c Ratio	1.43	0.93	1.33		1.45	0.18
Control Delay	231.6	32.1	167.1		259.5	17.7
Queue Delay	81.1	0.0	282.8		0.0	0.2
Total Delay	312.7	32.1	449.9		259.5	17.9
LOS	F	C	F		F	B
Approach Delay	186.9		449.9			193.7

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	F		F			F
Queue Length 50th (ft)	~1142	355	~704		~421	62
Queue Length 95th (ft)	#1353	#649	m45		#600	100
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	759	947	602		274	849
Starvation Cap Reductn	0	0	194		0	0
Spillback Cap Reductn	85	0	0		0	283
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.61	0.93	1.96		1.45	0.26

Intersection Summary

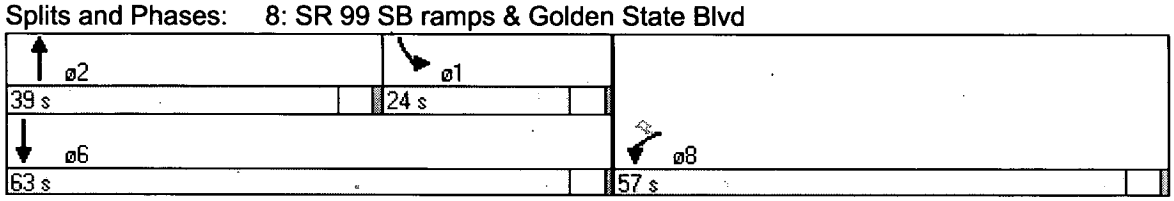
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 118 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.45
Intersection Signal Delay: 251.3 Intersection LOS: F
Intersection Capacity Utilization 124.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.947			0.853				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		26			393				84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	242	296	24	113	446	246	70	8	406	526	18	77
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	263	322	26	123	485	267	76	9	441	572	20	84
Lane Group Flow (vph)	263	322	26	123	752	0	76	450	0	572	20	84
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	19.0	45.0	45.0	20.4	46.4	0.0	16.8	20.6	0.0	34.0	37.8	37.8
Total Split (%)	15.8%	37.5%	37.5%	17.0%	38.7%	0.0%	14.0%	17.2%	0.0%	28.3%	31.5%	31.5%
Maximum Green (s)	14.4	40.4	40.4	15.8	41.8		12.2	16.0		29.4	33.2	33.2
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	15.0	47.8	47.8	13.7	46.5		10.7	12.5		30.0	33.9	33.9
Actuated g/C Ratio	0.12	0.40	0.40	0.11	0.39		0.09	0.10		0.25	0.28	0.28
v/c Ratio	1.28	0.47	0.04	0.63	1.12		0.53	0.89		1.33	0.04	0.17
Control Delay	201.4	31.3	9.8	63.8	101.5		65.1	29.9		198.1	29.1	6.9
Queue Delay	25.7	0.3	0.0	0.0	26.1		0.0	1.9		54.1	0.0	0.0
Total Delay	227.1	31.6	9.8	63.8	127.5		65.1	31.8		252.2	29.1	6.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	C	A	E	F		E	C		F	C	A
Approach Delay		114.8			118.6			36.6			215.1	
Approach LOS		F			F			D			F	
Queue Length 50th (ft)	~259	188	0	97	~688		57	41		~560	7	6
Queue Length 95th (ft)	#428	296	20	m154	#943		108	#215		m#633	m9	m9
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	205	688	600	233	673		172	539		430	533	513
Starvation Cap Reductn	0	0	0	0	0		0	0		36	0	0
Spillback Cap Reductn	9	87	0	0	35		0	26		9	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.34	0.54	0.04	0.53	1.18		0.44	0.88		1.45	0.04	0.16

Intersection Summary

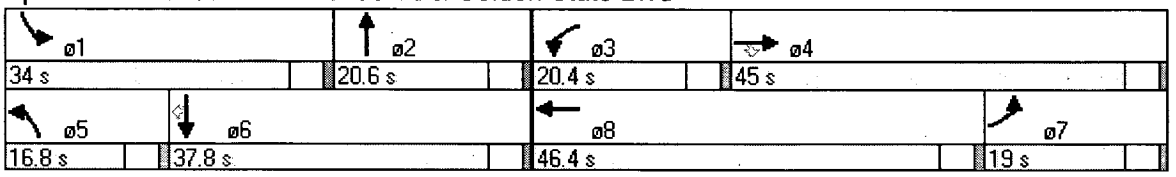
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.33
Intersection Signal Delay: 126.0 Intersection LOS: F
Intersection Capacity Utilization 119.9% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.957			0.857				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		18			279				70
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	420	409	14	138	652	260	149	23	466	1012	12	64
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	457	445	15	150	709	283	162	25	507	1100	13	70
Lane Group Flow (vph)	457	445	15	150	992	0	162	532	0	1100	13	70
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	19.0	43.6	43.6	18.4	43.0	0.0	24.1	21.0	0.0	37.0	33.9	33.9
Total Split (%)	15.8%	36.3%	36.3%	15.3%	35.8%	0.0%	20.1%	17.5%	0.0%	30.8%	28.3%	28.3%
Maximum Green (s)	14.4	39.0	39.0	13.8	38.4		19.5	16.4		32.4	29.3	29.3
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	15.0	40.3	40.3	13.7	39.0		42.6	17.0		33.0	7.4	7.4
Actuated g/C Ratio	0.12	0.34	0.34	0.11	0.32		0.36	0.14		0.28	0.06	0.06
v/c Ratio	2.17	0.75	0.03	0.77	1.74		0.27	1.17		2.37	0.12	0.44
Control Delay	566.1	44.7	12.0	77.0	360.9		29.6	119.6		638.1	73.5	35.6
Queue Delay	145.6	0.8	0.0	0.0	28.5		0.0	141.5		56.2	0.0	0.0
Total Delay	711.8	45.5	12.0	77.0	389.3		29.6	261.1		694.3	73.5	35.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D	B	E	F		C	F		F	E	D
Approach Delay		377.0			348.3			207.0			648.5	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~567	307	0	118	~1127		88	~293		~1387	11	24
Queue Length 95th (ft)	#773	436	16	m142	m#934		150	#513		m#947	m11	m16
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	211	596	516	204	570		599	455		464	443	429
Starvation Cap Reductn	0	0	0	0	0		0	0		18	0	0
Spillback Cap Reductn	95	30	0	0	20		0	98		250	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	3.94	0.79	0.03	0.74	1.80		0.27	1.49		5.14	0.03	0.16

Intersection Summary

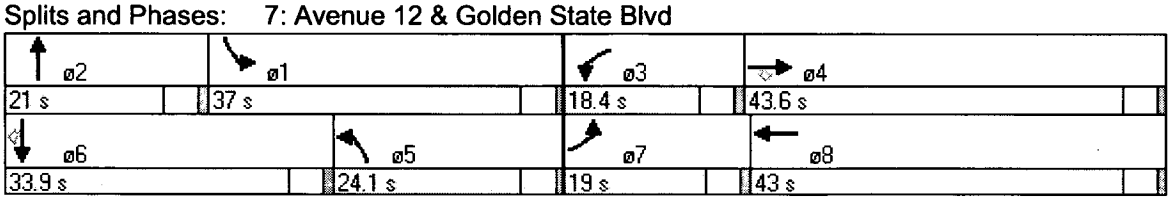
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.37
Intersection Signal Delay: 420.3 Intersection LOS: F
Intersection Capacity Utilization 172.8% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						843			86			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	106	1122	0	0	559	1086	245	11	409	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	120	1275	0	0	635	1234	278	12	465	0	0	0
Lane Group Flow (vph)	120	1275	0	0	635	1234	0	290	465	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	12.8	84.0	0.0	0.0	71.2	71.2	36.0	36.0	36.0	0.0	0.0	0.0
Total Split (%)	10.7%	70.0%	0.0%	0.0%	59.3%	59.3%	30.0%	30.0%	30.0%	0.0%	0.0%	0.0%
Maximum Green (s)	8.2	79.4			66.6	66.6	31.4	31.4	31.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	8.8	80.0			67.2	67.2		32.0	32.0			
Actuated g/C Ratio	0.07	0.67			0.56	0.56		0.27	0.27			
v/c Ratio	0.94	1.04			0.62	0.99		0.67	1.04			
Control Delay	92.5	45.2			21.2	33.8		48.3	88.3			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	92.5	45.2			21.2	33.8		48.3	88.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D			C	C		D	F			
Approach Delay		49.3			29.5			72.9				
Approach LOS		D			C			E				
Queue Length 50th (ft)	90	~710			316	449		201	~337			
Queue Length 95th (ft)	m#109	m608			422	#895		293	#525			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	128	1230			1023	1241		431	448			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.94	1.04			0.62	0.99		0.67	1.04			

Intersection Summary

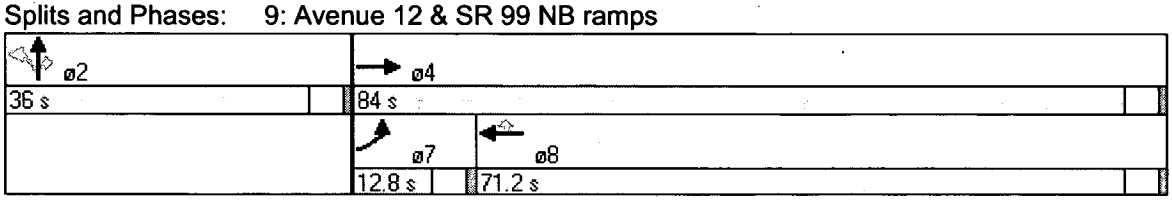
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 8 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 44.5 Intersection LOS: D
Intersection Capacity Utilization 97.3% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						901			12			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	126	1759	0	0	759	1578	292	3	658	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	143	1999	0	0	862	1793	332	3	748	0	0	0
Lane Group Flow (vph)	143	1999	0	0	862	1793	0	335	748	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	13.0	77.0	0.0	0.0	64.0	64.0	43.0	43.0	43.0	0.0	0.0	0.0
Total Split (%)	10.8%	64.2%	0.0%	0.0%	53.3%	53.3%	35.8%	35.8%	35.8%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	72.4			59.4	59.4	38.4	38.4	38.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	73.0			60.0	60.0		39.0	39.0			
Actuated g/C Ratio	0.08	0.61			0.50	0.50		0.32	0.32			
v/c Ratio	1.11	1.82			0.95	1.47		0.62	1.53			
Control Delay	111.7	390.0			49.9	232.6		40.3	277.7			
Queue Delay	0.0	1.5			0.0	0.0		0.0	0.0			
Total Delay	111.7	391.5			49.9	232.6		40.3	277.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			D	F		D	F			
Approach Delay		372.8			173.3			204.2				
Approach LOS		F			F			F				
Queue Length 50th (ft)	~130	~2393			617	~1548		219	~811			
Queue Length 95th (ft)	m86m	#1327			#870	#1746		312	#1020			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	129	1101			905	1220		540	490			
Starvation Cap Reductn	0	2			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	1.11	1.82			0.95	1.47		0.62	1.53			

Intersection Summary

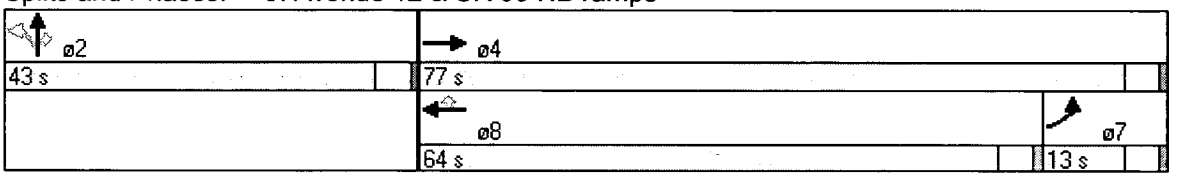
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.82
Intersection Signal Delay: 251.7 Intersection LOS: F
Intersection Capacity Utilization 140.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2030
Analysis Time Period	2030 Project AM Alt A		

Project Description

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	18	300	2	76	289	13
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	16	8	14	2	20	42
Percent Heavy Vehicles	11	–	–	19	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	15	8	13	2	19	39
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	82	314	14	19	326	2
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	19	82		64			38	
C (m) (veh/h)	1183	1142		454			314	
v/c	0.02	0.07		0.14			0.12	
95% queue length	0.05	0.23		0.49			0.41	
Control Delay (s/veh)	8.1	8.4		14.2			18.0	
LOS	A	A		B			C	
Approach Delay (s/veh)	–	–	14.2			18.0		
Approach LOS	–	–	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/12/2006 3:36 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2030
Analysis Time Period	2030 Project PM Alt A		

Project Description

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	25	444	4	99	457	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	13	11	9	2	13	117
Percent Heavy Vehicles	13	–	–	15	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	12	11	9	2	12	108
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	107	496	10	27	482	4
Percent Heavy Vehicles	7	7	7	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	27	107		132			33	
C (m) (veh/h)	1005	1013		432			137	
v/c	0.03	0.11		0.31			0.24	
95% queue length	0.08	0.35		1.28			0.89	
Control Delay (s/veh)	8.7	9.0		17.0			39.4	
LOS	A	A		C			E	
Approach Delay (s/veh)	–	–	17.0			39.4		
Approach LOS	–	–	C			E		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/12/2006 3:37 PM

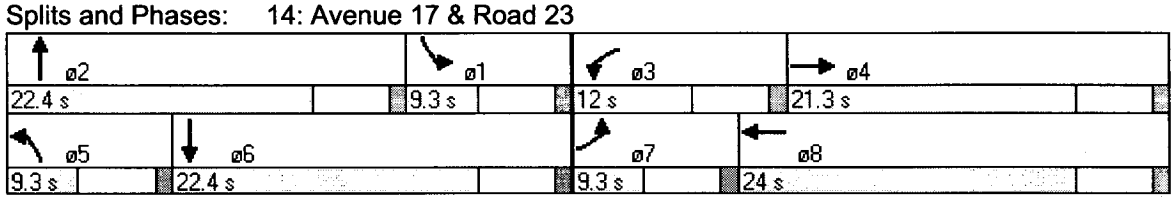
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.919			0.965			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1824	0	1770	1712	0	1770	1798	0	1770	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1824	0	1770	1712	0	1770	1798	0	1770	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			38			24			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	6	51	8	132	29	35	5	286	88	76	199	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	55	9	143	32	38	5	311	96	83	216	5
Lane Group Flow (vph)	7	64	0	143	70	0	5	407	0	83	221	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	12.0	24.0	0.0	9.3	22.4	0.0	9.3	22.4	0.0
Total Split (%)	14.3%	32.8%	0.0%	18.5%	36.9%	0.0%	14.3%	34.5%	0.0%	14.3%	34.5%	0.0%
Maximum Green (s)	4.0	16.0		6.7	18.7		4.0	17.1		4.0	17.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.8	9.4		9.1	16.1		5.8	31.5		5.8	35.6	
Actuated g/C Ratio	0.08	0.14		0.14	0.25		0.08	0.51		0.09	0.57	
v/c Ratio	0.05	0.24		0.57	0.15		0.03	0.44		0.53	0.21	
Control Delay	26.8	20.2		31.7	9.7		26.4	15.4		37.9	10.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.8	20.2		31.7	9.7		26.4	15.4		37.9	10.3	
LOS	C	C		C	A		C	B		D	B	
Approach Delay		20.9			24.5			15.5			17.9	
Approach LOS		C			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	2	16		46	7		2	108		27	39	
Queue Length 95th (ft)	12	44		#111	36		10	#216		#76	110	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	146	458		250	578		146	922		156	1062	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.14		0.57	0.12		0.03	0.44		0.53	0.21	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 62.2
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 18.5 Intersection LOS: B
Intersection Capacity Utilization 48.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



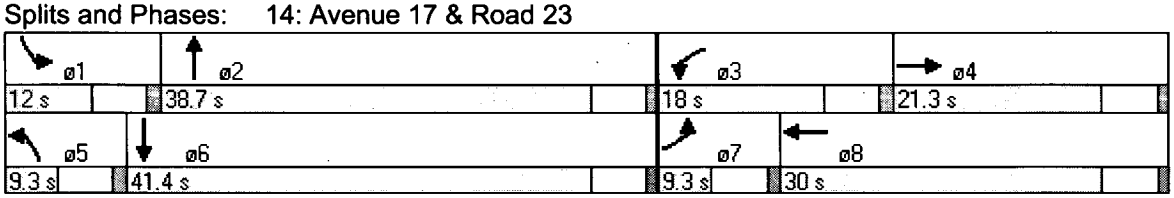
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.911			0.944			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1820	0	1770	1697	0	1770	1758	0	1770	1855	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1820	0	1770	1697	0	1770	1758	0	1770	1855	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			82			39			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	12	99	18	189	61	88	4	336	201	96	329	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	108	20	205	66	96	4	365	218	104	358	11
Lane Group Flow (vph)	13	128	0	205	162	0	4	583	0	104	369	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	18.0	30.0	0.0	9.3	38.7	0.0	12.0	41.4	0.0
Total Split (%)	10.3%	23.7%	0.0%	20.0%	33.3%	0.0%	10.3%	43.0%	0.0%	13.3%	46.0%	0.0%
Maximum Green (s)	4.0	16.0		12.7	24.7		4.0	33.4		6.7	36.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	11.9		13.1	24.5		5.3	38.3		7.9	45.7	
Actuated g/C Ratio	0.06	0.14		0.16	0.30		0.06	0.47		0.09	0.56	
v/c Ratio	0.12	0.48		0.72	0.29		0.04	0.69		0.63	0.36	
Control Delay	44.0	36.9		50.0	12.9		41.8	25.3		56.0	13.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	44.0	36.9		50.0	12.9		41.8	25.3		56.0	13.9	
LOS	D	D		D	B		D	C		E	B	
Approach Delay		37.6			33.6			25.4			23.1	
Approach LOS		D			C			C			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	7	59		104	28		2	247		54	102	
Queue Length 95th (ft)	26	111		#215	84		13	#461		#131	225	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	106	360		303	623		106	845		169	1039	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.36		0.68	0.26		0.04	0.69		0.62	0.36	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 81.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 27.7 Intersection LOS: C
Intersection Capacity Utilization 62.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



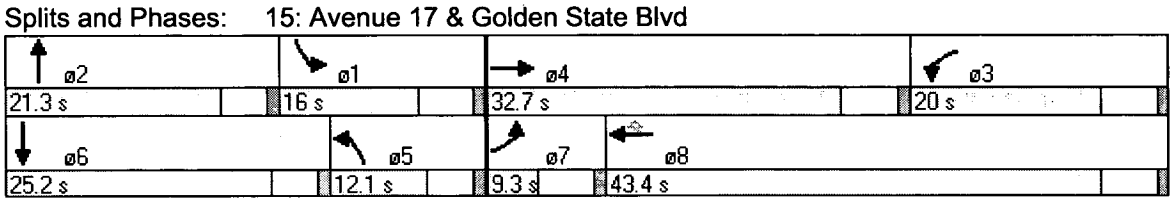
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.990				0.850		0.870			0.919	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1736	3471	1553	1492	1366	0	3433	1712	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3504	0	1736	3471	1553	1492	1366	0	3433	1712	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				605		285			20	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	41	841	62	231	998	557	49	40	262	354	16	18
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	45	914	67	251	1085	605	53	43	285	385	17	20
Lane Group Flow (vph)	45	981	0	251	1085	605	53	328	0	385	37	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	32.7	0.0	20.0	43.4	43.4	12.1	21.3	0.0	16.0	25.2	0.0
Total Split (%)	10.3%	36.3%	0.0%	22.2%	48.2%	48.2%	13.4%	23.7%	0.0%	17.8%	28.0%	0.0%
Maximum Green (s)	4.0	27.4		14.7	38.1	38.1	7.5	16.7		10.7	20.6	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	28.7		16.0	43.1	43.1	7.5	17.3		12.0	26.0	
Actuated g/C Ratio	0.06	0.32		0.18	0.48	0.48	0.08	0.19		0.13	0.29	
v/c Ratio	0.43	0.87		0.81	0.65	0.57	0.43	0.67		0.84	0.07	
Control Delay	54.1	38.9		44.9	13.9	3.5	49.9	13.9		55.9	16.8	
Queue Delay	0.0	0.0		0.0	0.2	0.3	0.0	0.0		0.0	0.0	
Total Delay	54.1	38.9		44.9	14.1	3.8	49.9	13.9		55.9	16.8	
LOS	D	D		D	B	A	D	B		E	B	
Approach Delay		39.5			14.9			18.9			52.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			B			B			D	
Queue Length 50th (ft)	25	272		140	241	47	29	21		111	8	
Queue Length 95th (ft)	60	#385		m#216	282	60	66	108		#185	32	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	104	1124		309	1663	1059	134	493		458	510	
Starvation Cap Reductn	0	0		0	109	109	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.43	0.87		0.81	0.70	0.64	0.40	0.67		0.84	0.07	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 26.2 Intersection LOS: C
Intersection Capacity Utilization 79.7% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.994				0.850		0.865			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3518	0	1656	3312	1482	1736	1580	0	3433	1703	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3518	0	1656	3312	1482	1736	1580	0	3433	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				616		259			53	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	60	1598	71	334	1507	818	110	54	476	884	36	49
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	65	1737	77	363	1638	889	120	59	517	961	39	53
Lane Group Flow (vph)	65	1814	0	363	1638	889	120	576	0	961	92	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	46.0	0.0	21.0	57.7	57.7	19.9	28.0	0.0	25.0	33.1	0.0
Total Split (%)	7.8%	38.3%	0.0%	17.5%	48.1%	48.1%	16.6%	23.3%	0.0%	20.8%	27.6%	0.0%
Maximum Green (s)	4.0	40.7		15.7	52.4	52.4	15.3	23.4		19.7	28.5	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	42.0		17.0	53.7	53.7	13.3	24.0		21.0	31.7	
Actuated g/C Ratio	0.04	0.35		0.14	0.45	0.45	0.11	0.20		0.18	0.26	
v/c Ratio	0.83	1.47		1.54	1.11	0.89	0.62	1.10		1.60	0.19	
Control Delay	120.3	247.0		285.2	79.6	10.3	64.7	95.2		310.7	18.2	
Queue Delay	0.0	30.2		0.0	93.9	15.0	0.0	507.4		0.0	0.0	
Total Delay	120.3	277.2		285.2	173.5	25.2	64.7	602.6		310.7	18.2	
LOS	F	F		F	F	C	E	F		F	B	
Approach Delay		271.8			141.9			509.8			285.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	51	~1022		~397	~757	128	90	~336		~548	23	
Queue Length 95th (ft)	#137	#1164		m#329	m532	m87	151	#560		#677	67	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	78	1234		235	1482	1004	230	523		601	488	
Starvation Cap Reductn	0	0		0	239	123	0	0		0	0	
Spillback Cap Reductn	0	54		0	0	0	0	266		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.83	1.54		1.54	1.32	1.01	0.52	2.24		1.60	0.19	

Intersection Summary

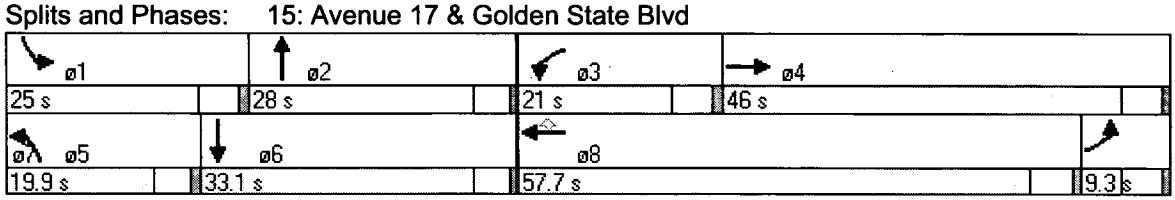
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 100 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.60
Intersection Signal Delay: 241.8 Intersection LOS: F
Intersection Capacity Utilization 135.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



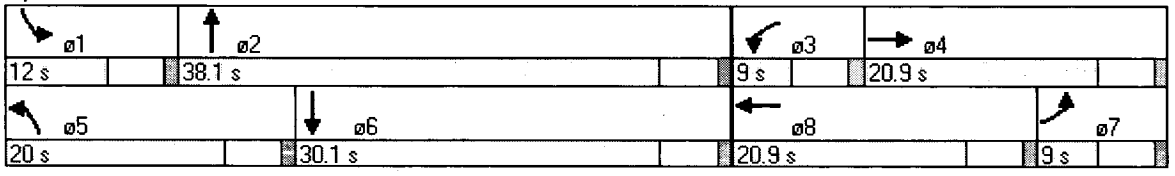
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.876			0.874			0.994			0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1541	0	1671	1538	0	1770	3518	0	1770	3507	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1541	0	1671	1538	0	1770	3518	0	1770	3507	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		77			159			6			9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	73	15	71	59	28	146	172	1180	45	132	369	25
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
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	79	16	77	64	30	159	187	1283	49	143	401	27
Lane Group Flow (vph)	79	93	0	64	189	0	187	1332	0	143	428	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	9.0	20.9	0.0	20.0	38.1	0.0	12.0	30.1	0.0
Total Split (%)	11.3%	26.1%	0.0%	11.3%	26.1%	0.0%	25.0%	47.6%	0.0%	15.0%	37.6%	0.0%
Maximum Green (s)	4.1	16.0		4.1	16.0		15.1	33.2		7.1	25.2	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	9.0		5.0	9.0		12.6	39.6		7.9	35.0	
Actuated g/C Ratio	0.07	0.13		0.07	0.13		0.18	0.57		0.11	0.50	
v/c Ratio	0.67	0.36		0.54	0.57		0.60	0.66		0.73	0.24	
Control Delay	63.5	13.9		52.7	14.9		34.4	17.4		54.6	15.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	63.5	13.9		52.7	14.9		34.4	17.4		54.6	15.1	
LOS	E	B		D	B		C	B		D	B	
Approach Delay		36.7			24.5			19.5			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			C			B			C	
Queue Length 50th (ft)	34	6		28	12		75	240		62	63	
Queue Length 95th (ft)	#110	44		#87	66		143	#394		#161	116	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	118	388		118	452		377	2025		197	1768	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.67	0.24		0.54	0.42		0.50	0.66		0.73	0.24	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 69.6
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 22.4 Intersection LOS: C
Intersection Capacity Utilization 69.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



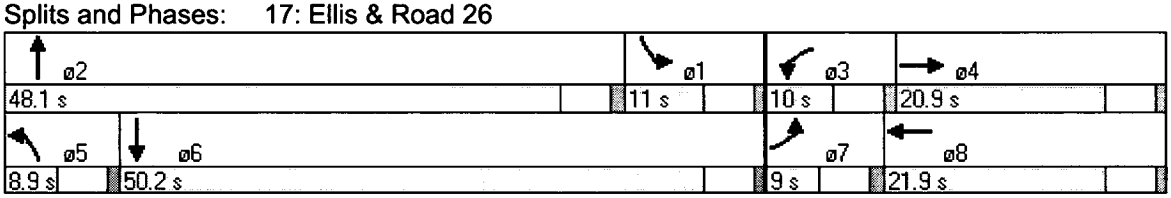
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.954			0.870			0.978			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1777	0	1770	1621	0	1770	3461	0	1770	3419	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1777	0	1770	1621	0	1770	3461	0	1770	3419	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			178			31			61	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	65	119	52	74	42	268	35	1194	207	100	1022	297
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	129	57	80	46	291	38	1298	225	109	1111	323
Lane Group Flow (vph)	71	186	0	80	337	0	38	1523	0	109	1434	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	10.0	21.9	0.0	8.9	48.1	0.0	11.0	50.2	0.0
Total Split (%)	10.0%	23.2%	0.0%	11.1%	24.3%	0.0%	9.9%	53.4%	0.0%	12.2%	55.8%	0.0%
Maximum Green (s)	4.1	16.0		5.1	17.0		4.0	43.2		6.1	45.3	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	13.3		6.3	14.0		5.2	40.8		7.3	44.1	
Actuated g/C Ratio	0.07	0.17		0.08	0.18		0.06	0.52		0.09	0.57	
v/c Ratio	0.61	0.58		0.58	0.77		0.34	0.83		0.67	0.73	
Control Delay	64.9	37.0		58.4	29.3		49.5	23.1		62.7	17.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	64.9	37.0		58.4	29.3		49.5	23.1		62.7	17.0	
LOS	E	D		E	C		D	C		E	B	
Approach Delay		44.7			34.9			23.8			20.2	
Approach LOS		D			C			C			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	40	84		44	83		21	370		61	308	
Queue Length 95th (ft)	#112	151		#116	#191		53	#513		#152	420	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	117	405		139	510		112	1919		162	2039	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.61	0.46		0.58	0.66		0.34	0.79		0.67	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 78
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 25.0 Intersection LOS: C
Intersection Capacity Utilization 80.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 Project AM Alt A		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	379	8	1	344	24
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	1	1	34	1	30
Percent Heavy Vehicles	8	–	–	10	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	32	1	28
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	373	26	1	411	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		65			3	
C (m) (veh/h)	1128	1098		377			361	
v/c	0.00	0.00		0.17			0.01	
95% queue length	0.00	0.00		0.62			0.03	
Control Delay (s/veh)	8.2	8.3		16.5			15.1	
LOS	A	A		C			C	
Approach Delay (s/veh)	–	–	16.5			15.1		
Approach LOS	–	–	C			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 Project PM Alt A		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	536	33	5	505	111
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	2	2	41	3	53
Percent Heavy Vehicles	17	–	–	9	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	2	2	38	3	49
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	5	548	120	2	582	35
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	2	5		97			5	
C (m) (veh/h)	855	930		246			163	
v/c	0.00	0.01		0.39			0.03	
95% queue length	0.01	0.02		1.78			0.09	
Control Delay (s/veh)	9.2	8.9		28.8			27.8	
LOS	A	A		D			D	
Approach Delay (s/veh)	–	–	28.8			27.8		
Approach LOS	–	–	D			D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/12/2006 3:35 PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.972			0.943			0.988			0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1759	0	1626	1614	0	1504	1564	0	1570	1553	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1759	0	1626	1614	0	1504	1564	0	1570	1553	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			38			6			43	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	25	126	29	9	114	70	18	154	14	43	102	69
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	27	137	32	10	124	76	20	167	15	47	111	75
Lane Group Flow (vph)	27	169	0	10	200	0	20	182	0	47	186	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	13.6	25.7	0.0	13.3	25.4	0.0	13.3	25.9	0.0	15.1	27.7	0.0
Total Split (%)	17.0%	32.1%	0.0%	16.6%	31.8%	0.0%	16.6%	32.4%	0.0%	18.9%	34.6%	0.0%
Maximum Green (s)	8.3	20.4		8.0	20.1		8.0	20.6		9.8	22.4	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	7.9	15.2		7.6	12.9		7.9	32.0		8.6	34.5	
Actuated g/C Ratio	0.12	0.25		0.11	0.21		0.12	0.54		0.13	0.59	
v/c Ratio	0.13	0.38		0.05	0.54		0.11	0.21		0.23	0.20	
Control Delay	29.8	18.6		32.0	22.7		32.3	15.9		30.1	10.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.8	18.6		32.0	22.7		32.3	15.9		30.1	10.7	
LOS	C	B		C	C		C	B		C	B	
Approach Delay		20.1			23.1			17.5			14.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	6	30		2	32		4	18		10	14	
Queue Length 95th (ft)	36	114		19	127		29	129		51	109	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	251	621		225	543		208	853		261	929	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.27		0.04	0.37		0.10	0.21		0.18	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 58.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 18.7 Intersection LOS: B
Intersection Capacity Utilization 39.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
15.1 s	25.9 s	13.3 s	25.7 s
ø5	ø6	ø7	ø8
13.3 s	27.7 s	13.6 s	25.4 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949			0.932			0.991			0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1670	0	1736	1703	0	1703	1776	0	1556	1566	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1670	0	1736	1703	0	1703	1776	0	1556	1566	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			63			5			35	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	66	89	46	15	154	128	51	235	16	96	223	94
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	72	97	50	16	167	139	55	255	17	104	242	102
Lane Group Flow (vph)	72	147	0	16	306	0	55	272	0	104	344	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.1	0.0	11.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	35.5%	0.0%	17.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	17.8		6.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	17.0		5.3	13.6		5.3	23.1		7.3	26.8	
Actuated g/C Ratio	0.08	0.29		0.08	0.23		0.08	0.39		0.12	0.46	
v/c Ratio	0.51	0.29		0.11	0.69		0.38	0.39		0.56	0.47	
Control Delay	42.5	13.5		31.7	25.1		36.0	18.8		40.0	16.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	42.5	13.5		31.7	25.1		36.0	18.8		40.0	16.9	
LOS	D	B		C	C		D	B		D	B	
Approach Delay		23.1			25.4			21.7			22.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	27	26		6	83		21	84		39	98	
Queue Length 95th (ft)	#76	76		23	158		53	154		#101	186	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	142	583		140	521		145	701		188	734	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.51	0.25		0.11	0.59		0.38	0.39		0.55	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 58.7
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 23.0 Intersection LOS: C
Intersection Capacity Utilization 53.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
11.3 s	23.1 s	9.3 s	21.3 s
ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

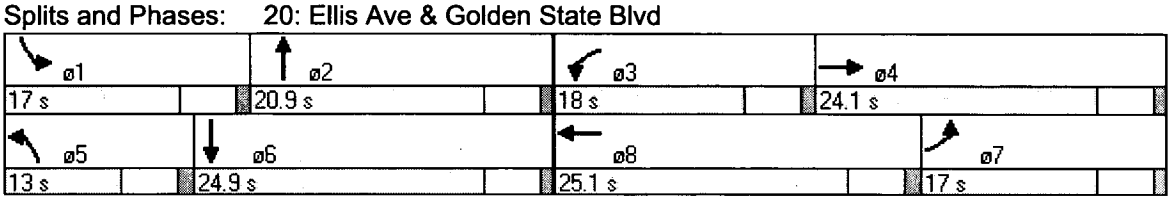
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.960			0.914			0.889			0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3398	0	3433	3235	0	1752	3116	0	2575	1302	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3398	0	3433	3235	0	1752	3116	0	2575	1302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61			412			471			51	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	165	378	136	392	306	409	108	152	433	269	106	88
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	36%	36%	36%
Adj. Flow (vph)	179	411	148	426	333	445	117	165	471	292	115	96
Lane Group Flow (vph)	179	559	0	426	778	0	117	636	0	292	211	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	17.0	24.1	0.0	18.0	25.1	0.0	13.0	20.9	0.0	17.0	24.9	0.0
Total Split (%)	21.3%	30.1%	0.0%	22.5%	31.4%	0.0%	16.3%	26.1%	0.0%	21.3%	31.1%	0.0%
Maximum Green (s)	12.1	19.2		13.1	20.2		8.1	16.0		12.1	20.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.0	25.0		14.7	26.7		8.6	11.8		12.5	17.9	
Actuated g/C Ratio	0.16	0.31		0.18	0.33		0.11	0.15		0.16	0.22	
v/c Ratio	0.62	0.51		0.68	0.57		0.62	0.74		0.72	0.64	
Control Delay	41.8	23.2		29.0	7.2		49.4	13.9		43.4	30.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	41.8	23.2		29.0	7.2		49.4	13.9		43.4	30.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C		C	A		D	B		D	C	
Approach Delay		27.7			14.9			19.4			38.1	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	84	111		85	84		57	39		71	75	
Queue Length 95th (ft)	#153	168		m117	m43		#120	85		#121	138	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	288	1105		647	1354		197	1030		418	379	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.62	0.51		0.66	0.57		0.59	0.62		0.70	0.56	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 41 (51%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 70.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.958			0.920			0.882			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	3433	3256	0	1597	2818	0	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	3433	3256	0	1597	2818	0	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			262			479			25	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	202	583	227	845	498	571	191	254	919	407	184	120
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	220	634	247	918	541	621	208	276	999	442	200	130
Lane Group Flow (vph)	220	881	0	918	1162	0	208	1275	0	442	330	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	19.9	33.0	0.0	32.0	45.1	0.0	24.2	37.0	0.0	18.0	30.8	0.0
Total Split (%)	16.6%	27.5%	0.0%	26.7%	37.6%	0.0%	20.2%	30.8%	0.0%	15.0%	25.7%	0.0%
Maximum Green (s)	15.0	28.1		27.1	40.2		19.3	32.1		13.1	25.9	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	15.9	29.0		28.0	41.1		22.4	33.0		14.0	24.6	
Actuated g/C Ratio	0.13	0.24		0.23	0.34		0.19	0.28		0.12	0.20	
v/c Ratio	0.94	1.03		1.15	0.90		0.70	1.35dr		1.10	0.87	
Control Delay	96.3	81.7		102.8	21.6		60.2	98.3		124.3	65.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	96.3	81.7		102.8	21.6		60.2	98.3		124.3	65.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F		F	C		E	F		F	E	
Approach Delay		84.6			57.4			93.0			99.1	
Approach LOS		F			E			F			F	
Queue Length 50th (ft)	171	~370		~426	220		156	~455		~201	226	
Queue Length 95th (ft)	#325	#502		m#434	m237		#273	#595		#305	#371	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	235	854		801	1287		298	1122		401	411	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.94	1.03		1.15	0.90		0.70	1.14		1.10	0.80	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.15
Intersection Signal Delay: 78.5 Intersection LOS: E
Intersection Capacity Utilization 109.2% ICU Level of Service H
Analysis Period (min) 15

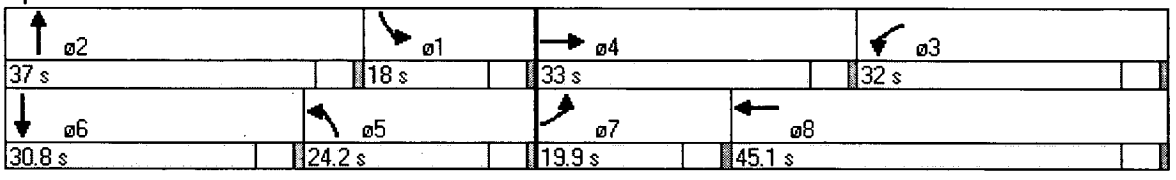
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



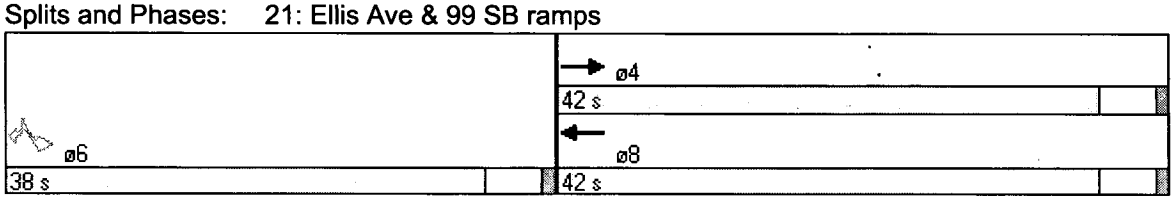
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												143
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1076	0	0	673	0	0	0	0	353	0	433
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
Heavy Vehicles (%)	3%	3%	3%	14%	14%	14%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	1170	0	0	732	0	0	0	0	384	0	471
Lane Group Flow (vph)	0	1170	0	0	732	0	0	0	0	384	0	471
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	42.0	0.0	0.0	42.0	0.0	0.0	0.0	0.0	38.0	0.0	38.0
Total Split (%)	0.0%	52.5%	0.0%	0.0%	52.5%	0.0%	0.0%	0.0%	0.0%	47.5%	0.0%	47.5%
Maximum Green (s)		37.1			37.1					33.1		33.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		47.1			47.1					24.9		24.9
Actuated g/C Ratio		0.59			0.59					0.31		0.31
v/c Ratio		0.57			0.39					0.72		0.82
Control Delay		6.7			7.1					31.7		29.0
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		6.7			7.1					31.7		29.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			A					C		C
Approach Delay		6.7			7.1							
Approach LOS		A			A							
Queue Length 50th (ft)		58			60					167		152
Queue Length 95th (ft)		204			m187					220		227
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2063			1864					724		730
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.57			0.39					0.53		0.65

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 79 (99%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 14.1 Intersection LOS: B
Intersection Capacity Utilization 78.9% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
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
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Flt Permitted										0.950		
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												43
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1909	0	0	1108	0	0	0	0	573	0	806
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	2075	0	0	1204	0	0	0	0	623	0	876
Lane Group Flow (vph)	0	2075	0	0	1204	0	0	0	0	623	0	876
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	64.0	0.0	0.0	64.0	0.0	0.0	0.0	0.0	56.0	0.0	56.0
Total Split (%)	0.0%	53.3%	0.0%	0.0%	53.3%	0.0%	0.0%	0.0%	0.0%	46.7%	0.0%	46.7%
Maximum Green (s)		59.1			59.1					51.1		51.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		60.0			60.0					52.0		52.0
Actuated g/C Ratio		0.50			0.50					0.43		0.43
v/c Ratio		1.17			0.68					0.83		1.26
Control Delay		96.9			10.2					41.2		157.0
Queue Delay		0.0			0.8					0.0		0.0
Total Delay		96.9			10.9					41.2		157.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			B					D		F
Approach Delay		96.9			10.9							
Approach LOS		F			B							
Queue Length 50th (ft)		~1004			301					419		~835
Queue Length 95th (ft)		m#848			m181					#602		#1085
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		1770			1770					752		697
Starvation Cap Reductn		0			264					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		1.17			0.80					0.83		1.26

Intersection Summary

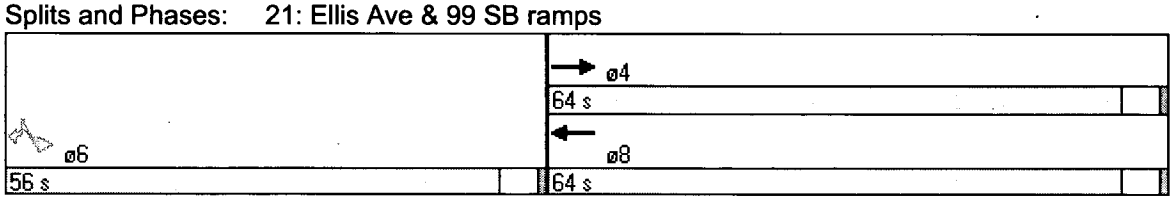
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 79.0 Intersection LOS: E
Intersection Capacity Utilization 127.8% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



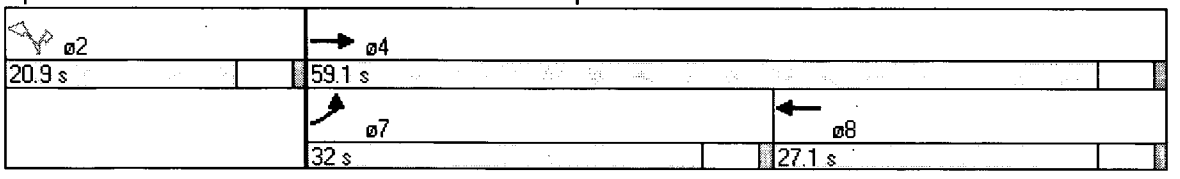
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.938				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1736	3471	0	0	3107	0	3273	0	1509	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1736	3471	0	0	3107	0	3273	0	1509	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					221				322			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	545	519	0	0	544	379	402	0	296	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	9%	9%	9%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	592	564	0	0	591	412	437	0	322	0	0	0
Lane Group Flow (vph)	592	564	0	0	1003	0	437	0	322	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	32.0	59.1	0.0	0.0	27.1	0.0	20.9	0.0	20.9	0.0	0.0	0.0
Total Split (%)	40.0%	73.9%	0.0%	0.0%	33.9%	0.0%	26.1%	0.0%	26.1%	0.0%	0.0%	0.0%
Maximum Green (s)	27.1	54.2			22.2		16.0		16.0			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	28.8	56.3			23.5		15.7		15.7			
Actuated g/C Ratio	0.36	0.70			0.29		0.20		0.20			
v/c Ratio	0.95	0.23			0.94		0.68		0.58			
Control Delay	45.2	3.7			39.0		35.5		8.1			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	45.2	3.7			39.0		35.5		8.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			D		D		A			
Approach Delay		24.9			39.0							
Approach LOS		C			D							
Queue Length 50th (ft)	259	21			207		103		0			
Queue Length 95th (ft)	#484	40			#340		150		65			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	624	2443			1070		691		573			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	0.95	0.23			0.94		0.63		0.56			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 38 (48%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 29.5 Intersection LOS: C
Intersection Capacity Utilization 78.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
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
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.944				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3309	0	3433	0	1583	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3309	0	3433	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					115				230			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	982	842	0	0	978	589	614	0	455	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1067	915	0	0	1063	640	667	0	495	0	0	0
Lane Group Flow (vph)	1067	915	0	0	1703	0	667	0	495	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	50.0	96.0	0.0	0.0	46.0	0.0	24.0	0.0	24.0	0.0	0.0	0.0
Total Split (%)	41.7%	80.0%	0.0%	0.0%	38.3%	0.0%	20.0%	0.0%	20.0%	0.0%	0.0%	0.0%
Maximum Green (s)	45.1	91.1			41.1		19.1		19.1			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	46.0	92.0			42.0		20.0		20.0			
Actuated g/C Ratio	0.38	0.77			0.35		0.17		0.17			
v/c Ratio	1.57	0.34			1.38		1.17		1.09			
Control Delay	280.9	3.3			207.2		136.7		92.8			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	280.9	3.3			207.2		136.7		92.8			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	A			F		F		F			
Approach Delay		152.8			207.2							
Approach LOS		F			F							
Queue Length 50th (ft)	~1178	87			~895		~316		~272			
Queue Length 95th (ft)	m#1041	m91			#1037		#435		#487			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	679	2713			1233		572		456			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	1.57	0.34			1.38		1.17		1.09			

Intersection Summary

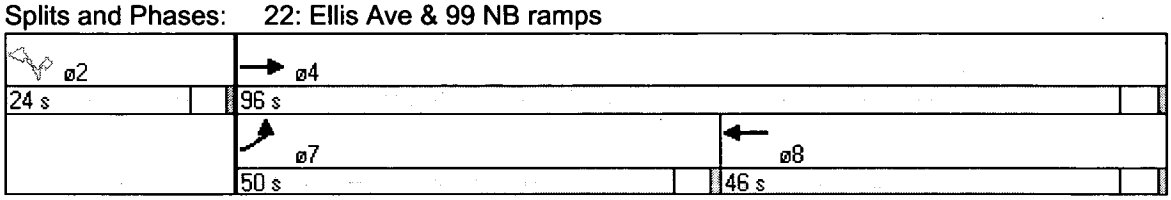
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.57
Intersection Signal Delay: 163.6 Intersection LOS: F
Intersection Capacity Utilization 127.8% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



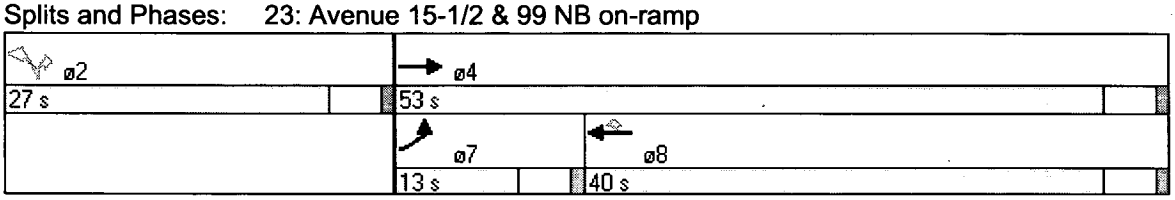
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						526			116			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	292	957	0	0	1299	484	386	0	468	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	317	1040	0	0	1412	526	420	0	509	0	0	0
Lane Group Flow (vph)	317	1040	0	0	1412	526	420	0	509	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	13.0	53.0	0.0	0.0	40.0	40.0	27.0	0.0	27.0	0.0	0.0	0.0
Total Split (%)	16.3%	66.3%	0.0%	0.0%	50.0%	50.0%	33.8%	0.0%	33.8%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	48.4			35.4	35.4	22.4		22.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	9.0	49.0			36.0	36.0	23.0		23.0			
Actuated g/C Ratio	0.11	0.61			0.45	0.45	0.29		0.29			
v/c Ratio	0.82	0.48			0.90	0.53	0.45		0.99			
Control Delay	55.5	2.1			30.4	3.6	25.2		63.0			
Queue Delay	0.0	0.1			0.0	0.0	0.0		0.0			
Total Delay	55.5	2.2			30.4	3.6	25.2		63.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			C	A	C		E			
Approach Delay		14.6			23.1							
Approach LOS		B			C							
Queue Length 50th (ft)	68	13			331	0	88		204			
Queue Length 95th (ft)	#143	24			#480	52	129		#408			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	386	2168			1562	988	932		512			
Starvation Cap Reductn	0	236			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.82	0.54			0.90	0.53	0.45		0.99			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 77 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 25.4 Intersection LOS: C
Intersection Capacity Utilization 65.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						465			3			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	473	2153	0	0	2072	807	794	0	810	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	514	2340	0	0	2252	877	863	0	880	0	0	0
Lane Group Flow (vph)	514	2340	0	0	2252	877	863	0	880	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	15.0	66.0	0.0	0.0	51.0	51.0	44.0	0.0	44.0	0.0	0.0	0.0
Total Split (%)	13.6%	60.0%	0.0%	0.0%	46.4%	46.4%	40.0%	0.0%	40.0%	0.0%	0.0%	0.0%
Maximum Green (s)	10.4	61.4			46.4	46.4	39.4		39.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	11.0	62.0			47.0	47.0	40.0		40.0			
Actuated g/C Ratio	0.10	0.56			0.43	0.43	0.36		0.36			
v/c Ratio	1.50	1.17			1.49	0.93	0.70		1.54			
Control Delay	262.8	98.0			251.2	31.4	33.5		279.3			
Queue Delay	0.0	61.2			0.0	0.0	1.5		0.0			
Total Delay	262.8	159.3			251.2	31.4	35.0		279.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			F	C	D		F			
Approach Delay		177.9			189.6							
Approach LOS		F			F							
Queue Length 50th (ft)	~260	~1034			~1159	323	265		~882			
Queue Length 95th (ft)	m#229	m#888			#1296	#637	336		#1126			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	343	1995			1512	943	1236		572			
Starvation Cap Reductn	0	209			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	200		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.50	1.31			1.49	0.93	0.83		1.54			

Intersection Summary

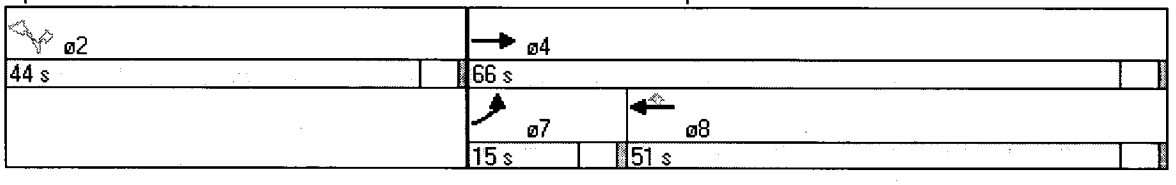
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 1 (1%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.54
Intersection Signal Delay: 178.2 Intersection LOS: F
Intersection Capacity Utilization 183.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



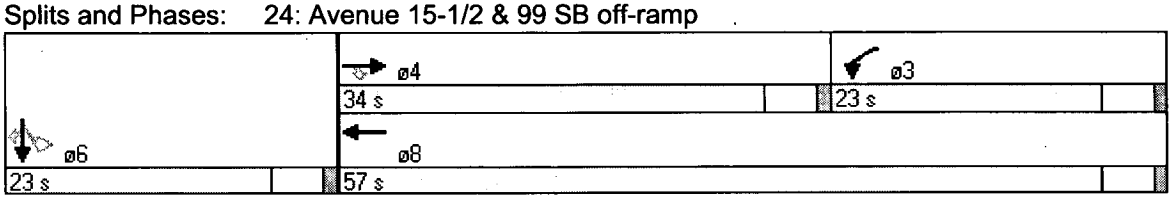
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			475									89
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	882	437	535	1150	0	0	0	0	367	1	236
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	959	475	582	1250	0	0	0	0	399	1	257
Lane Group Flow (vph)	0	959	475	582	1250	0	0	0	0	200	200	257
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	34.0	34.0	23.0	57.0	0.0	0.0	0.0	0.0	23.0	23.0	23.0
Total Split (%)	0.0%	42.5%	42.5%	28.8%	71.3%	0.0%	0.0%	0.0%	0.0%	28.8%	28.8%	28.8%
Maximum Green (s)		29.4	29.4	18.4	52.4					18.4	18.4	18.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		34.0	34.0	19.0	57.0					15.0	15.0	15.0
Actuated g/C Ratio		0.42	0.42	0.24	0.71					0.19	0.19	0.19
v/c Ratio		0.64	0.50	0.73	0.51					0.63	0.63	0.69
Control Delay		21.4	3.9	22.1	1.8					38.6	38.5	29.3
Queue Delay		0.0	0.0	0.0	0.3					0.0	0.0	0.0
Total Delay		21.4	3.9	22.1	2.1					38.6	38.5	29.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A					D	D	C
Approach Delay		15.6			8.5						34.9	
Approach LOS		B			A						C	
Queue Length 50th (ft)		195	0	134	18					96	96	77
Queue Length 95th (ft)		282	58	m168	m42					158	158	148
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1502	945	800	2472					399	400	444
Starvation Cap Reductn		0	0	0	551					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.64	0.50	0.73	0.65					0.50	0.50	0.58

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 65.2% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.952	
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1681	1685	1583
Flt Permitted				0.950						0.950	0.952	
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1681	1685	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			643									6
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1828	828	487	2379	0	0	0	0	798	1	392
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1987	900	529	2586	0	0	0	0	867	1	426
Lane Group Flow (vph)	0	1987	900	529	2586	0	0	0	0	434	434	426
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	61.0	61.0	19.0	80.0	0.0	0.0	0.0	0.0	30.0	30.0	30.0
Total Split (%)	0.0%	55.5%	55.5%	17.3%	72.7%	0.0%	0.0%	0.0%	0.0%	27.3%	27.3%	27.3%
Maximum Green (s)		56.4	56.4	14.4	75.4					25.4	25.4	25.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		57.0	57.0	15.0	76.0					26.0	26.0	26.0
Actuated g/C Ratio		0.52	0.52	0.14	0.69					0.24	0.24	0.24
v/c Ratio		1.08	0.80	1.13	1.06					1.09	1.09	1.12
Control Delay		74.6	11.9	97.2	37.3					113.0	112.1	123.3
Queue Delay		5.3	0.0	0.0	93.0					137.7	136.7	0.0
Total Delay		79.9	11.9	97.2	130.3					250.7	248.8	123.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	B	F	F					F	F	F
Approach Delay		58.7			124.7						208.1	
Approach LOS		E			F						F	
Queue Length 50th (ft)		~829	133	~224	~1055					~365	~364	~346
Queue Length 95th (ft)		#967	338	m163	m121					#571	#570	#544
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1834	1130	468	2445					397	398	379
Starvation Cap Reductn		0	0	0	408					0	0	0
Spillback Cap Reductn		21	0	0	0					90	90	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		1.10	0.80	1.13	1.27					1.41	1.41	1.12

Intersection Summary

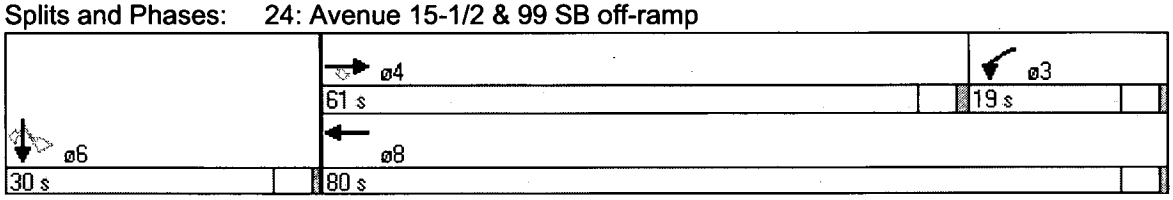
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 113.4 Intersection LOS: F
Intersection Capacity Utilization 183.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



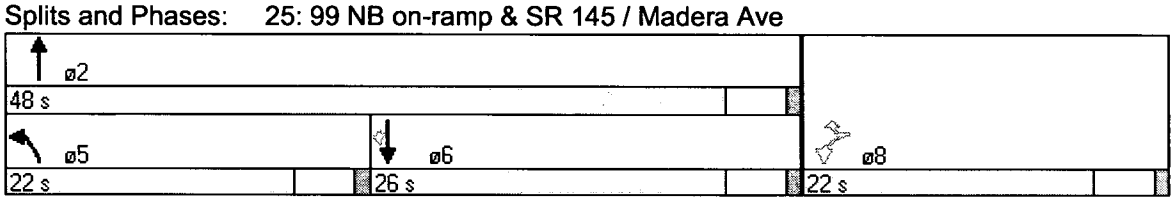
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						53						555
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	678	0	49	698	759	0	0	268	659
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	737	0	53	759	825	0	0	291	716
Lane Group Flow (vph)	0	0	0	737	0	53	759	825	0	0	291	716
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	22.0	0.0	22.0	22.0	48.0	0.0	0.0	26.0	26.0
Total Split (%)	0.0%	0.0%	0.0%	31.4%	0.0%	31.4%	31.4%	68.6%	0.0%	0.0%	37.1%	37.1%
Maximum Green (s)				17.4		17.4	17.4	43.4			21.4	21.4
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				18.0		18.0	18.4	44.0			21.6	21.6
Actuated g/C Ratio				0.26		0.26	0.26	0.63			0.31	0.31
v/c Ratio				0.83		0.12	0.84	0.70			0.51	0.82
Control Delay				34.8		7.3	27.8	7.2			23.6	14.9
Queue Delay				0.0		0.0	0.0	0.3			0.0	0.0
Total Delay				34.8		7.3	27.8	7.5			23.6	14.9
LOS				C		A	C	A			C	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								17.3			17.5	
Approach LOS								B			B	
Queue Length 50th (ft)				154		0	147	164			101	52
Queue Length 95th (ft)				#241		24	m149	m165			170	#266
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				905		456	911	1183			603	888
Starvation Cap Reductn				0		0	0	68			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.81		0.12	0.83	0.74			0.48	0.81

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 41 (59%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 21.0 Intersection LOS: C
Intersection Capacity Utilization 67.4% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
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
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						470
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	697	0	67	1123	1062	0	0	449	768
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	758	0	73	1221	1154	0	0	488	835
Lane Group Flow (vph)	0	0	0	758	0	73	1221	1154	0	0	488	835
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	26.0	49.4	0.0	0.0	23.4	23.4
Total Split (%)	0.0%	0.0%	0.0%	29.4%	0.0%	29.4%	37.1%	70.6%	0.0%	0.0%	33.4%	33.4%
Maximum Green (s)				16.0		16.0	21.4	44.8			18.8	18.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				16.6		16.6	22.0	45.4			19.4	19.4
Actuated g/C Ratio				0.24		0.24	0.31	0.65			0.28	0.28
v/c Ratio				0.93		0.17	1.13	0.96			0.95	1.07
Control Delay				46.7		7.2	79.5	9.7			55.9	68.1
Queue Delay				0.0		0.0	0.0	35.8			0.0	0.0
Total Delay				46.7		7.2	79.5	45.6			55.9	68.1
LOS				D		A	E	D			E	E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								63.0			63.6	
Approach LOS								E			E	
Queue Length 50th (ft)				164		0	~313	114			205	~245
Queue Length 95th (ft)				#268		29	m117	m70			#382	#456
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				814		431	1079	1208			516	778
Starvation Cap Reductn				0		0	0	142			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.93		0.17	1.13	1.08			0.95	1.07

Intersection Summary

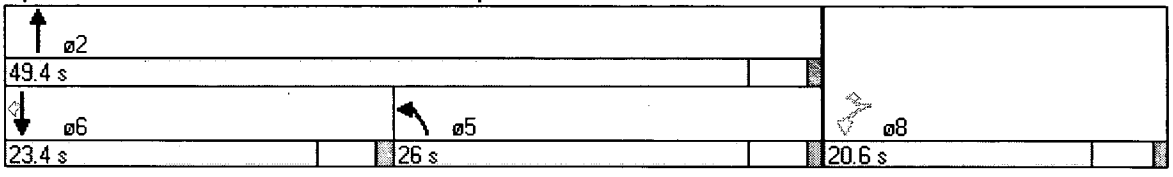
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 3 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 59.6 Intersection LOS: E
Intersection Capacity Utilization 86.3% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						97
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	793	719	0	809	371
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	862	782	0	879	403
Lane Group Flow (vph)	0	862	782	0	879	403
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	34.0	34.0	0.0	36.0	36.0
Total Split (%)	0.0%	48.6%	48.6%	0.0%	51.4%	51.4%
Maximum Green (s)		29.4	29.4		31.4	31.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		30.0	30.0		32.0	32.0
Actuated g/C Ratio		0.43	0.43		0.46	0.46
v/c Ratio		1.08	0.98		1.10	0.52
Control Delay		78.6	35.3		83.8	13.0
Queue Delay		88.0	63.4		3.4	0.0
Total Delay		166.6	98.7		87.2	13.0
LOS		F	F		F	B
Approach Delay		166.6	98.7		63.9	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	F		E	
Queue Length 50th (ft)		~425	204		~439	86
Queue Length 95th (ft)		#631	m#457		#647	162
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		798	798		801	769
Starvation Cap Reductn		0	123		0	0
Spillback Cap Reductn		127	0		6	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.28	1.16		1.11	0.52

Intersection Summary

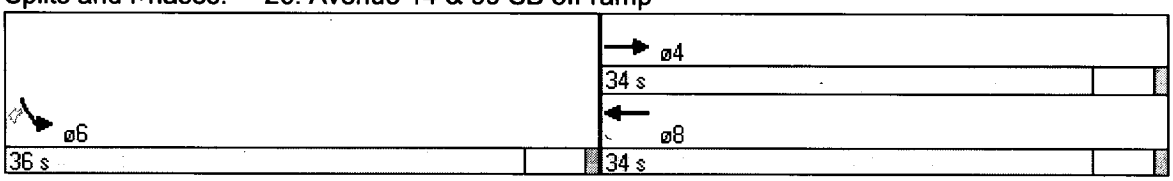
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 10 (14%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 103.5 Intersection LOS: F
Intersection Capacity Utilization 93.2% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						79
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	1118	778	0	1164	311
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1215	846	0	1265	338
Lane Group Flow (vph)	0	1215	846	0	1265	338
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	34.0	34.0	0.0	36.0	36.0
Total Split (%)	0.0%	48.6%	48.6%	0.0%	51.4%	51.4%
Maximum Green (s)		29.4	29.4		31.4	31.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		30.0	30.0		32.0	32.0
Actuated g/C Ratio		0.43	0.43		0.46	0.46
v/c Ratio		1.52	1.06		1.56	0.44
Control Delay		263.7	47.7		281.3	11.9
Queue Delay		116.4	86.8		71.8	0.0
Total Delay		380.1	134.4		353.1	11.9
LOS		F	F		F	B
Approach Delay		380.1	134.4		281.1	
Approach LOS		F	F		F	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		~748	~391		~789	69
Queue Length 95th (ft)		#976	m#411		#1021	132
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		798	798		809	767
Starvation Cap Reductn		0	129		0	0
Spillback Cap Reductn		116	0		75	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.78	1.26		1.72	0.44

Intersection Summary

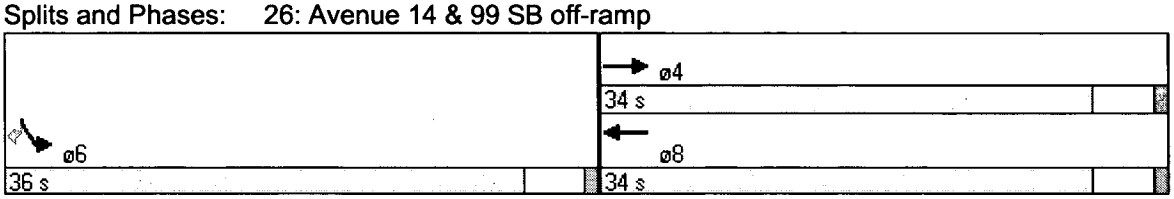
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 4 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.56
Intersection Signal Delay: 280.1 Intersection LOS: F
Intersection Capacity Utilization 130.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.996	
Satd. Flow (prot)	3335	1810	1538	0	0	0	1752	1845	1568	0	3491	1568
Flt Permitted	0.950						0.950				0.591	
Satd. Flow (perm)	3335	1810	1538	0	0	0	1752	1845	1568	0	2071	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			479						98			458
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	384	363	855	0	0	0	298	1073	90	40	485	421
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	417	395	929	0	0	0	324	1166	98	43	527	458
Lane Group Flow (vph)	417	395	929	0	0	0	324	1166	98	0	570	458
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	26.0	26.0	26.0	0.0	0.0	0.0	17.3	44.0	44.0	26.7	26.7	26.7
Total Split (%)	37.1%	37.1%	37.1%	0.0%	0.0%	0.0%	24.7%	62.9%	62.9%	38.1%	38.1%	38.1%
Maximum Green (s)	21.4	21.4	21.4				12.7	39.4	39.4	22.1	22.1	22.1
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	22.0	22.0	22.0				14.0	40.0	40.0		22.0	22.0
Actuated g/C Ratio	0.31	0.31	0.31				0.20	0.57	0.57		0.31	0.31
v/c Ratio	0.40	0.69	1.14				0.92	1.11	0.10		0.88	0.57
Control Delay	19.2	22.4	81.4				63.7	80.1	2.0		20.8	3.7
Queue Delay	30.5	264.6	121.3				4.7	0.0	0.0		0.0	4.2
Total Delay	49.7	287.1	202.7				68.4	80.1	2.0		20.8	7.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	F	F				E	F	A		C	A
Approach Delay		185.2						72.9			15.1	
Approach LOS		F						E			B	
Queue Length 50th (ft)	75	144	~321				140	~586	0		42	10
Queue Length 95th (ft)	m68	m132	m#249				#289	#812	17		m#72	m16
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1048	569	812				351	1054	938		672	818
Starvation Cap Reductn	641	319	157				0	0	0		0	0
Spillback Cap Reductn	11	0	0				12	0	0		0	275
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.02	1.58	1.42				0.96	1.11	0.10		0.85	0.84

Intersection Summary

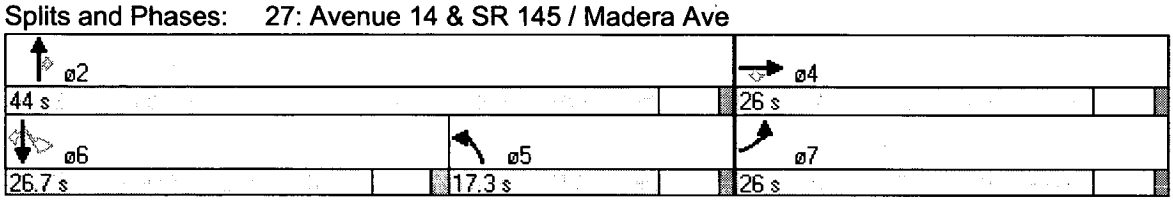
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 104.1 Intersection LOS: F
Intersection Capacity Utilization 100.1% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.994	
Satd. Flow (prot)	3367	1827	1553	0	0	0	1770	1863	1583	0	3518	1583
Flt Permitted	0.950						0.950				0.604	
Satd. Flow (perm)	3367	1827	1553	0	0	0	1770	1863	1583	0	2138	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			379						63			475
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	471	547	1264	0	0	0	341	1714	96	82	627	437
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	512	595	1374	0	0	0	371	1863	104	89	682	475
Lane Group Flow (vph)	512	595	1374	0	0	0	371	1863	104	0	771	475
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	31.0	31.0	31.0	0.0	0.0	0.0	14.0	39.0	39.0	25.0	25.0	25.0
Total Split (%)	44.3%	44.3%	44.3%	0.0%	0.0%	0.0%	20.0%	55.7%	55.7%	35.7%	35.7%	35.7%
Maximum Green (s)	26.4	26.4	26.4				9.4	34.4	34.4	20.4	20.4	20.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	27.0	27.0	27.0				10.0	35.0	35.0		21.0	21.0
Actuated g/C Ratio	0.39	0.39	0.39				0.14	0.50	0.50		0.30	0.30
v/c Ratio	0.39	0.84	1.65				1.47	2.00	0.13		1.20	0.59
Control Delay	14.5	21.0	311.9				257.8	472.7	5.0		123.0	12.9
Queue Delay	105.0	485.9	246.1				78.3	0.0	0.0		0.0	2.0
Total Delay	119.5	506.9	557.9				336.1	472.7	5.0		123.0	14.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F	F				F	F	A		F	B
Approach Delay		455.2						430.2			81.8	
Approach LOS		F						F			F	
Queue Length 50th (ft)	73	215	~884				~224	~1282	9		~230	107
Queue Length 95th (ft)	m44	m116	m#252				#378	#1531	31		m#257	m126
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1299	705	832				253	932	823		641	807
Starvation Cap Reductn	879	419	207				0	0	0		0	0
Spillback Cap Reductn	0	0	0				27	0	0		0	193
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.22	2.08	2.20				1.64	2.00	0.13		1.20	0.77

Intersection Summary

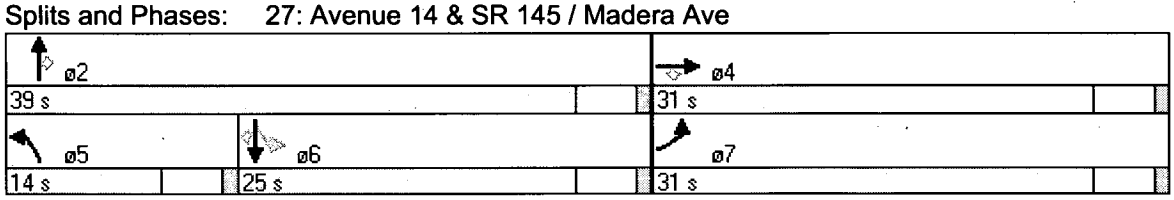
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 20 (29%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.00
Intersection Signal Delay: 368.9 Intersection LOS: F
Intersection Capacity Utilization 148.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	420			333	225
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	71	477	0	0	378	255
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						250
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	284
Percent Heavy Vehicles	0	0	0	0	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	71							284
C (m) (veh/h)	803							523
v/c	0.09							0.54
95% queue length	0.29							3.22
Control Delay (s/veh)	9.9							19.8
LOS	A							C
Approach Delay (s/veh)	–	–				19.8		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 7:11 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2 | North/South Street: Pistachio

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	607			483	263
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	689	0	0	548	298
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						280
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	318
Percent Heavy Vehicles	0	0	0	0	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	82							318
C (m) (veh/h)	670							431
v/c	0.12							0.74
95% queue length	0.42							5.94
Control Delay (s/veh)	11.1							33.4
LOS	B							D
Approach Delay (s/veh)	–	–				33.4		
Approach LOS	–	–				D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 6:37 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2	North/South Street: Godlen State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	40	53	471	51	115
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	45	60	535	57	130
Percent Heavy Vehicles	8	–	–	46	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	30	78	245	111	45	4
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	34	88	278	126	51	4
Percent Heavy Vehicles	20	20	20	79	79	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	535		400			181	
C (m) (veh/h)	1352	1252		133			0	
v/c	0.00	0.43		3.01				
95% queue length	0.01	2.19		37.39				
Control Delay (s/veh)	7.7	10.0		974.3				
LOS	A	B		F			F	
Approach Delay (s/veh)	–	–	974.3					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 5:04 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2 | North/South Street: Golden State / Road 23

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	12	90	77	604	100	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	13	102	87	686	113	144
Percent Heavy Vehicles	5	–	–	49	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	42	89	409	127	63	5
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	47	101	464	144	71	5
Percent Heavy Vehicles	20	20	20	48	48	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	13	686		612			220	
C (m) (veh/h)	1290	1147		0			0	
v/c	0.01	0.60						
95% queue length	0.03	4.16						
Control Delay (s/veh)	7.8	12.7						
LOS	A	B		F			F	
Approach Delay (s/veh)	–	–						
Approach LOS	–	–						

Copyright © 2005 University of Florida, All Rights Reserved HCS+™ Version 5.2 Generated: 8/30/2006 5:06 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2	North/South Street: Golden State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	12	90	77	604	100	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	13	102	87	686	113	144
Percent Heavy Vehicles	5	–	–	49	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	42	89	409	127	63	5
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	47	101	464	144	71	5
Percent Heavy Vehicles	20	20	20	48	48	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	13	686		612			220	
C (m) (veh/h)	1290	1147		0			0	
v/c	0.01	0.60						
95% queue length	0.03	4.16						
Control Delay (s/veh)	7.8	12.7						
LOS	A	B		F			F	
Approach Delay (s/veh)	–	–						
Approach LOS	–	–						

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 5:06 PM

ATTACHMENT VI – C - 28

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

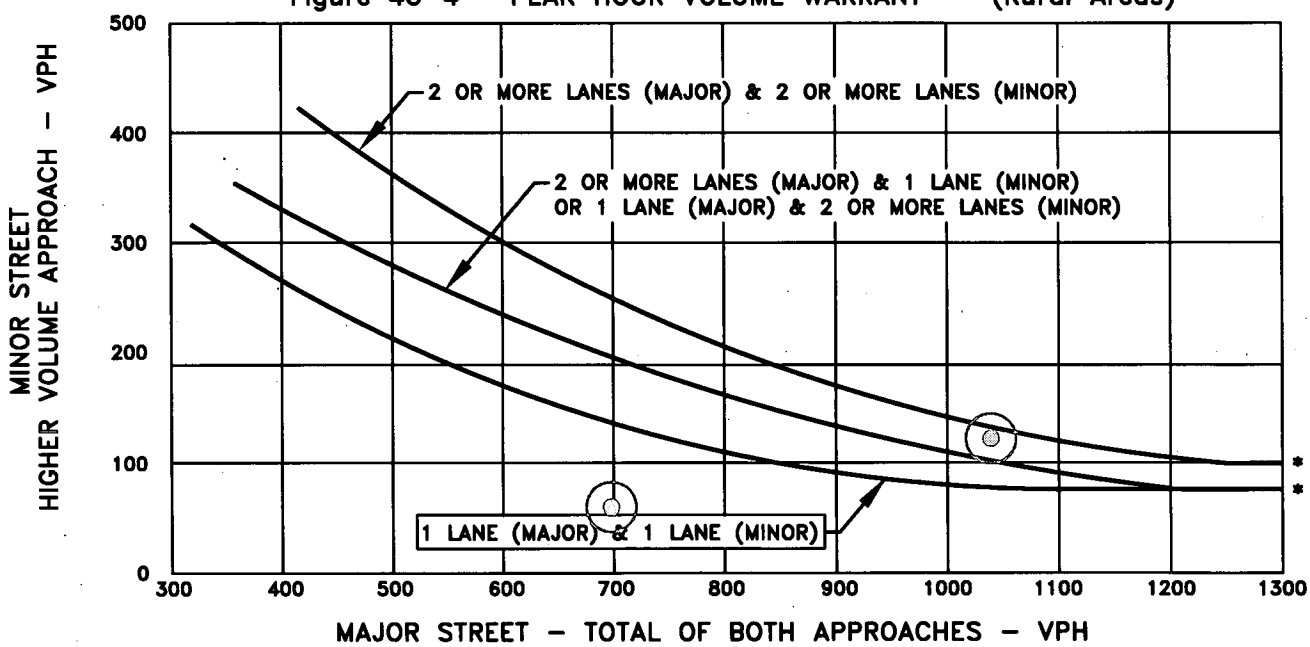
CONDITION: 2030 PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		698	1039				
Highest Approaches – Minor Street	✓		60	122				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

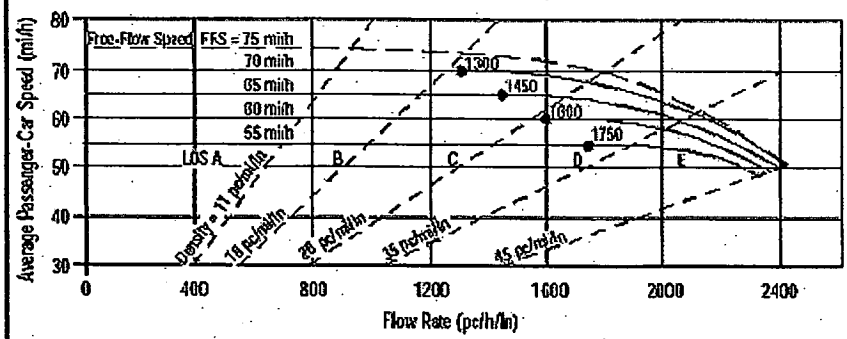
ATTACHMENT VI – C - 29

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4260*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1735*	pc/h/ln
S	*68.5*	mi/h
D = v_p / S	*25.3*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

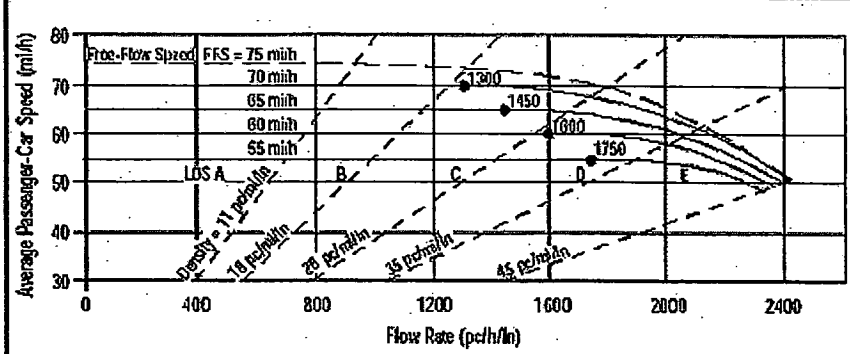
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt b

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4402*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

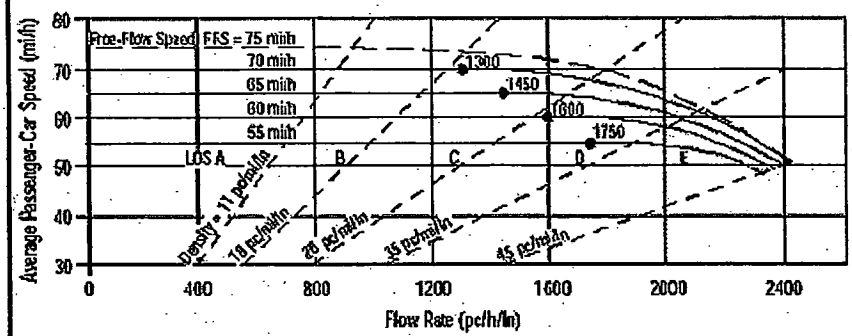
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1793*	pc/h/ln	Design LOS		
S	*67.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*26.4*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*3524*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

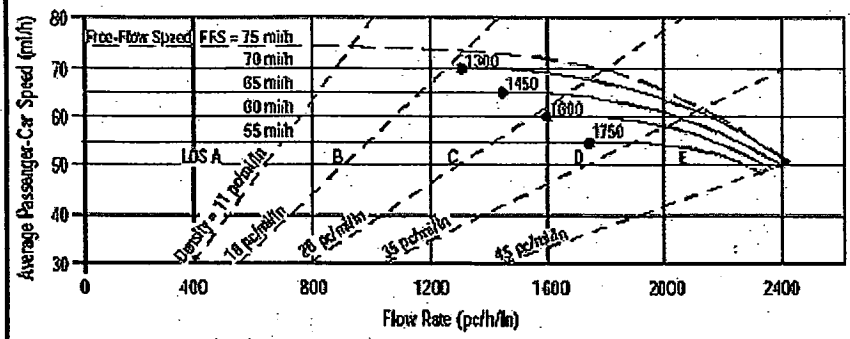
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1435*	pc/h/ln	Design LOS		
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*20.5*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5338*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

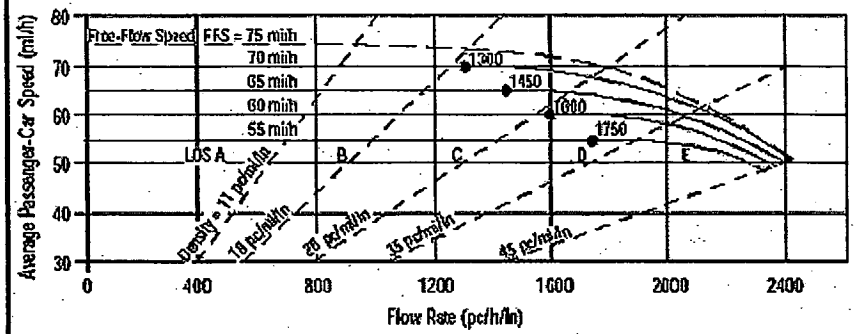
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2174*	pc/h/ln	Design LOS		
S	*60.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*35.7*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4635*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1888*	pc/h/ln
S	*66.7*	mi/h
D = v_p / S	*28.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

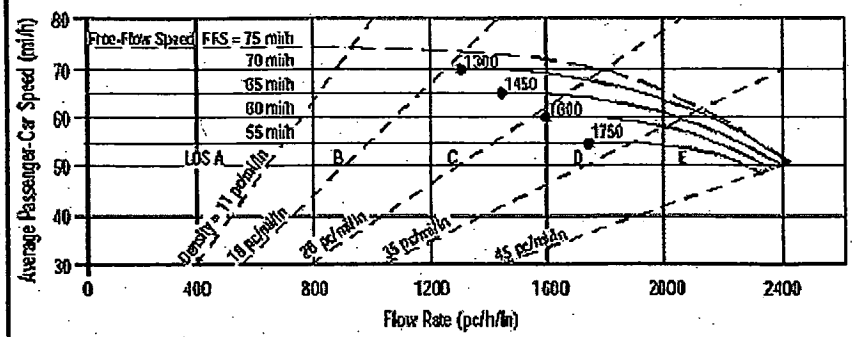
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4699*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1914*	pc/h/ln
S	*66.3*	mi/h
D = v_p / S	*28.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

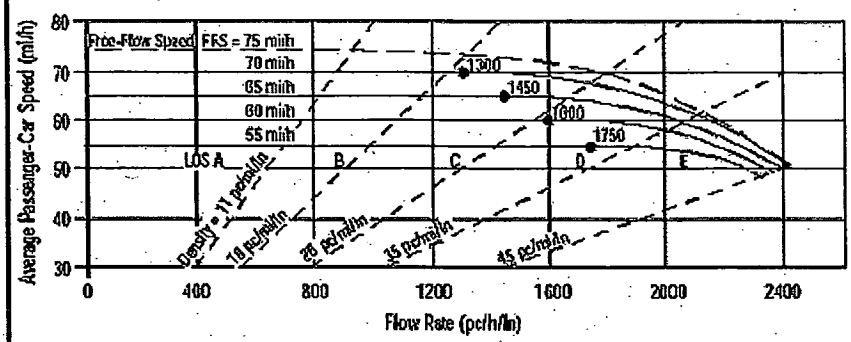
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3793*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1545*	pc/h/ln
S	*69.7*	mi/h
D = v_p / S	*22.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

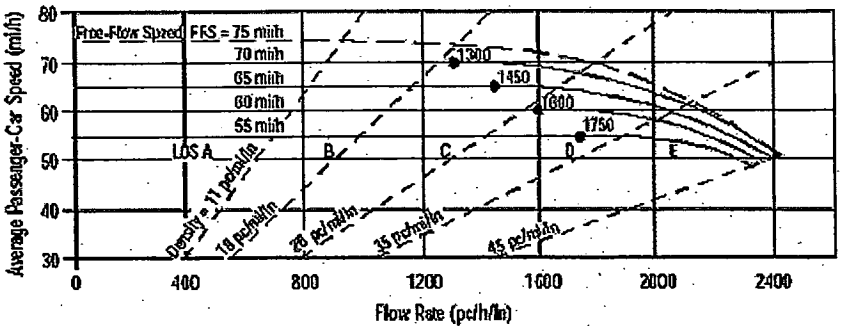
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5733*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

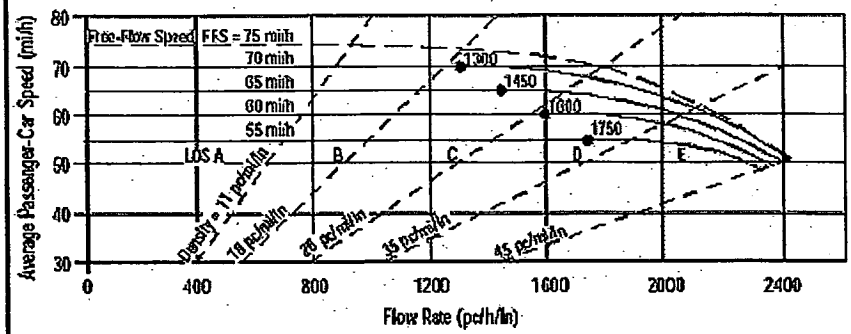
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2335*	pc/h/ln	Design LOS		
S	*55.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*41.9*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5332*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

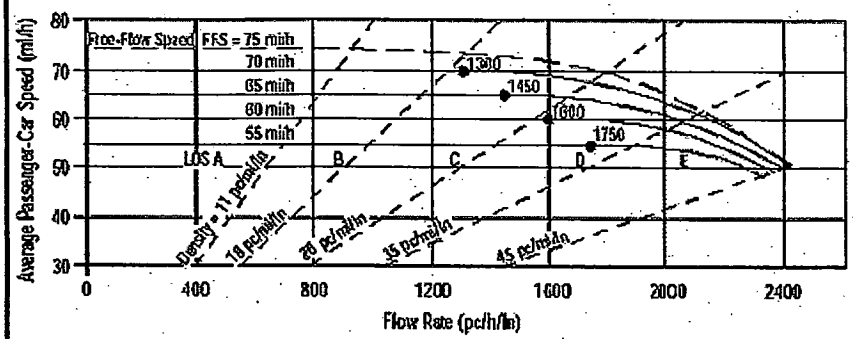
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2171*	pc/h/ln	Design LOS		
S	*60.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*35.6*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6315*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

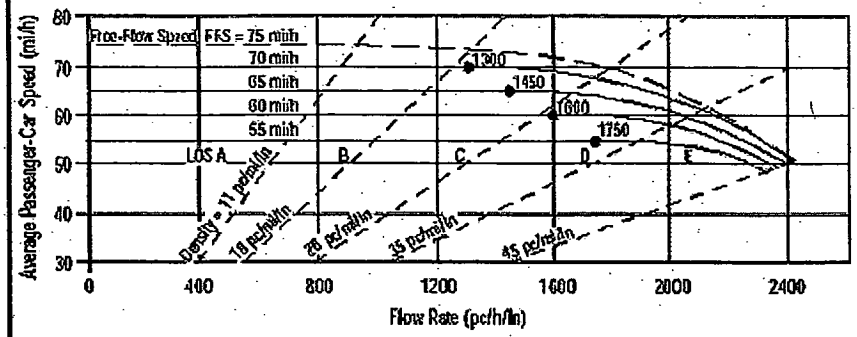
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2572*	pc/h/ln	Design LOS		
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S		pc/mi/ln	S		mi/h
LOS	*F*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4051*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1237*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*17.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

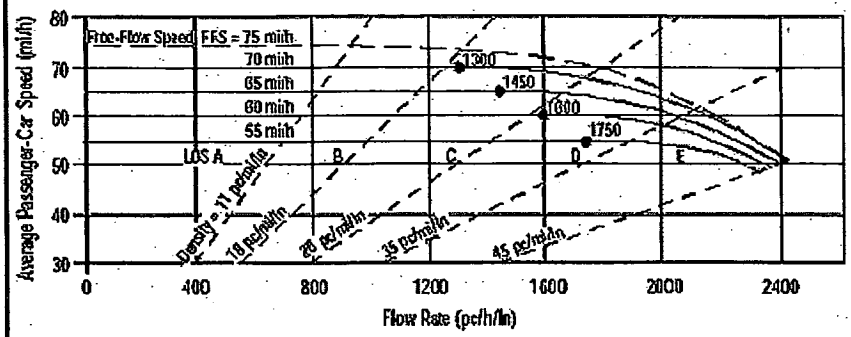
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7025*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2146*	pc/h/ln
S	*61.6*	mi/h
D = v_p / S	*34.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 30

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.880	
Flt Protected					0.994	
Satd. Flow (prot)	0	1473	1557	0	1213	0
Flt Permitted					0.994	
Satd. Flow (perm)	0	1473	1557	0	1213	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					303	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	499	298	0	34	267
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	567	339	0	39	303
Lane Group Flow (vph)	0	567	339	0	342	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	44.0	44.0	0.0	26.0	0.0
Total Split (%)	0.0%	62.9%	62.9%	0.0%	37.1%	0.0%
Maximum Green (s)		39.4	39.4		21.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		40.0	40.0		22.0	
Actuated g/C Ratio		0.57	0.57		0.31	
v/c Ratio		0.67	0.38		0.58	
Control Delay		15.5	1.8		8.3	
Queue Delay		0.0	0.0		0.0	
Total Delay		15.5	1.8		8.3	
LOS		B	A		A	
Approach Delay		15.5	1.8		8.3	
Approach LOS		B	A		A	
90th %ile Green (s)		39.4	39.4		21.4	
90th %ile Term Code		Coord	Coord		MaxR	

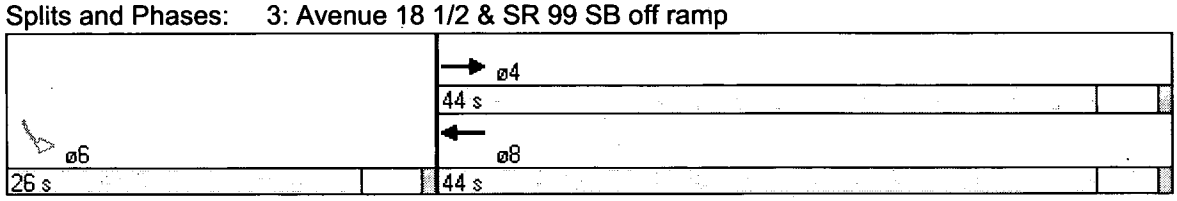
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		39.4	39.4		21.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		39.4	39.4		21.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		39.4	39.4		21.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		39.4	39.4		21.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		154	7		12	
Queue Length 95th (ft)		252	m7		72	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		842	890		589	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.67	0.38		0.58	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 58 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 51.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.883	
Flt Protected					0.993	
Satd. Flow (prot)	0	1473	1557	0	1216	0
Flt Permitted					0.993	
Satd. Flow (perm)	0	1473	1557	0	1216	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					459	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	680	348	0	65	423
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	773	395	0	74	481
Lane Group Flow (vph)	0	773	395	0	555	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	47.0	47.0	0.0	23.0	0.0
Total Split (%)	0.0%	67.1%	67.1%	0.0%	32.9%	0.0%
Maximum Green (s)		42.4	42.4		18.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		43.0	43.0		19.0	
Actuated g/C Ratio		0.61	0.61		0.27	
v/c Ratio		0.85	0.41		0.84	
Control Delay		23.0	1.1		18.5	
Queue Delay		0.0	0.0		0.0	
Total Delay		23.0	1.1		18.5	
LOS		C	A		B	
Approach Delay		23.0	1.1		18.5	
Approach LOS		C	A		B	
90th %ile Green (s)		42.4	42.4		18.4	
90th %ile Term Code		Coord	Coord		MaxR	

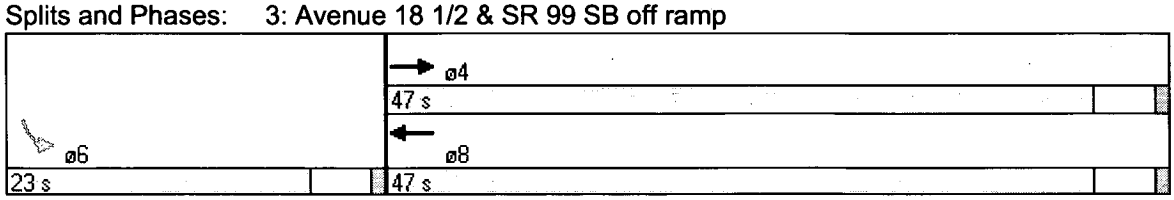
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		42.4	42.4		18.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		42.4	42.4		18.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		42.4	42.4		18.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		42.4	42.4		18.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		238	1		33	
Queue Length 95th (ft)		#474	m1		#207	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		905	956		664	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.85	0.41		0.84	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 51 (73%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 16.6 Intersection LOS: B
Intersection Capacity Utilization 72.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.960				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1220	1284	0	0	1673	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1220	1284	0	0	1673	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28				21			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	253	84	0	0	116	48	243	0	36	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	288	95	0	0	132	55	276	0	41	0	0	0
Lane Group Flow (vph)	288	95	0	0	187	0	0	276	41	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	25.8	47.0	0.0	0.0	21.2	0.0	23.0	23.0	23.0	0.0	0.0	0.0
Total Split (%)	36.9%	67.1%	0.0%	0.0%	30.3%	0.0%	32.9%	32.9%	32.9%	0.0%	0.0%	0.0%
Maximum Green (s)	21.2	42.4			16.6		18.4	18.4	18.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	21.8	44.6			18.8			17.4	17.4			
Actuated g/C Ratio	0.31	0.64			0.27			0.25	0.25			
v/c Ratio	0.76	0.12			0.40			0.83	0.13			
Control Delay	24.1	2.4			21.6			47.1	13.4			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	24.1	2.4			21.6			47.1	13.4			

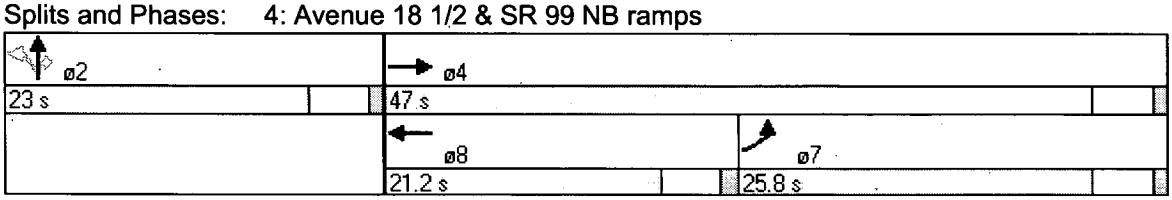
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		18.7			21.6			42.7				
Approach LOS		B			C			D				
90th %ile Green (s)	21.2	42.4			16.6		18.4	18.4	18.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	21.2	42.4			16.6		18.4	18.4	18.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	21.2	42.4			16.6		18.4	18.4	18.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	21.2	44.1			18.3		16.7	16.7	16.7			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	21.2	48.6			22.8		12.2	12.2	12.2			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	111	4			57			109	6			
Queue Length 95th (ft)	m#211	m7			109			#214	28			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	380	818			469			363	340			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.76	0.12			0.40			0.76	0.12			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.9 Intersection LOS: C
Intersection Capacity Utilization 51.3% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.977				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1480	1557	0	0	1614	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1480	1557	0	0	1614	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					14				39			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	374	120	0	0	169	35	281	0	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	425	136	0	0	192	40	319	0	89	0	0	0
Lane Group Flow (vph)	425	136	0	0	232	0	0	319	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	27.0	48.0	0.0	0.0	21.0	0.0	22.0	22.0	22.0	0.0	0.0	0.0
Total Split (%)	38.6%	68.6%	0.0%	0.0%	30.0%	0.0%	31.4%	31.4%	31.4%	0.0%	0.0%	0.0%
Maximum Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	22.1	44.8			18.7			17.2	17.2			
Actuated g/C Ratio	0.32	0.64			0.27			0.25	0.25			
v/c Ratio	0.91	0.14			0.52			0.86	0.25			
Control Delay	32.4	2.1			26.5			49.6	15.1			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	32.4	2.1			26.5			49.6	15.1			

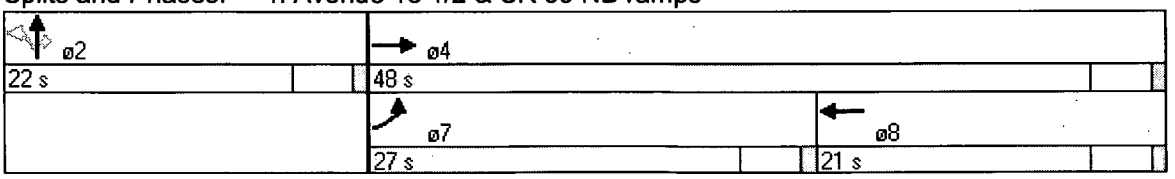
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		25.0			26.5			42.1				
Approach LOS		C			C			D				
90th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
30th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
10th %ile Green (s)	17.7	47.4			25.1		13.4	13.4	13.4			
10th %ile Term Code	Gap	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	122	9			82			129	17			
Queue Length 95th (ft)	m#194	m10			146			#250	49			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	486	997			443			387	375			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.87	0.14			0.52			0.82	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 36 (51%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 31.1 Intersection LOS: C
Intersection Capacity Utilization 72.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



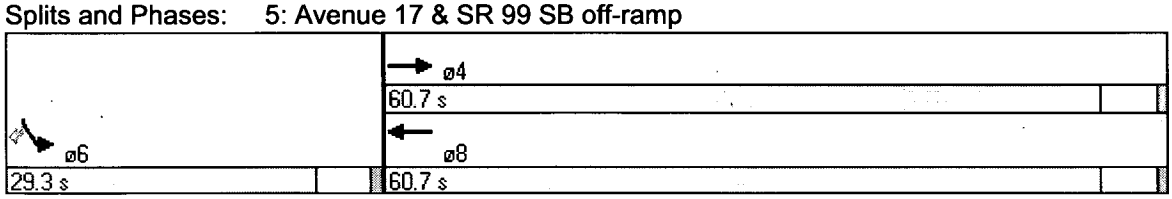
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3374	3505	0	1703	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	3374	3505	0	1703	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						30
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1432	1479	0	155	244
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	1627	1681	0	176	277
Lane Group Flow (vph)	0	1627	1681	0	176	277
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	60.7	60.7	0.0	29.3	29.3
Total Split (%)	0.0%	67.4%	67.4%	0.0%	32.6%	32.6%
Maximum Green (s)		55.4	55.4		24.0	24.0
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		61.9	61.9		20.1	20.1
Actuated g/C Ratio		0.69	0.69		0.22	0.22
v/c Ratio		0.70	0.70		0.46	0.76
Control Delay		3.3	4.2		33.3	42.4
Queue Delay		0.3	0.0		0.0	0.0
Total Delay		3.6	4.2		33.3	42.4
LOS		A	A		C	D
Approach Delay		3.6	4.2		38.9	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		D	
Queue Length 50th (ft)		43	55		86	131
Queue Length 95th (ft)		76	m260		134	200
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2321	2411		479	450
Starvation Cap Reductn		198	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.77	0.70		0.37	0.62

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 65 (72%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 8.1 Intersection LOS: A
Intersection Capacity Utilization 74.5% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3343	0	1671	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3343	0	1671	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						8
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	2859	2252	0	334	347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	3249	2559	0	380	394
Lane Group Flow (vph)	0	3249	2559	0	380	394
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	90.0	90.0	0.0	30.0	30.0
Total Split (%)	0.0%	75.0%	75.0%	0.0%	25.0%	25.0%
Maximum Green (s)		84.7	84.7		24.7	24.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		86.0	86.0		26.0	26.0
Actuated g/C Ratio		0.72	0.72		0.22	0.22
v/c Ratio		1.31	1.07		1.05	1.19
Control Delay		156.8	43.0		106.6	153.6
Queue Delay		25.3	71.7		0.0	3.1
Total Delay		182.1	114.8		106.6	156.7
LOS		F	F		F	F
Approach Delay		182.1	114.8		132.1	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	F		F	
Queue Length 50th (ft)		~1674	~1146		~321	~366
Queue Length 95th (ft)		m324	m243		#496	#546
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2488	2396		362	330
Starvation Cap Reductn		103	29		0	0
Spillback Cap Reductn		0	318		0	2
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.36	1.23		1.05	1.20

Intersection Summary

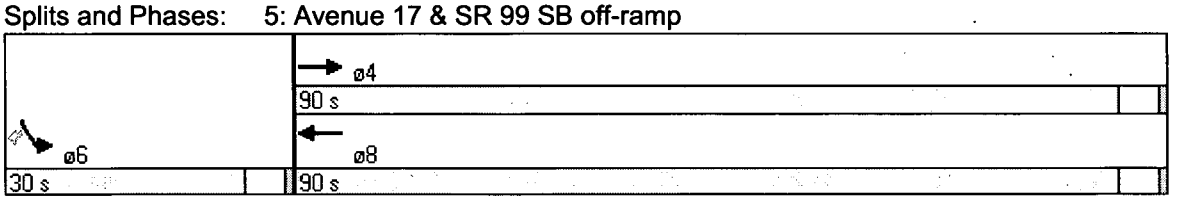
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 78 (65%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.31
Intersection Signal Delay: 150.0 Intersection LOS: F
Intersection Capacity Utilization 109.1% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



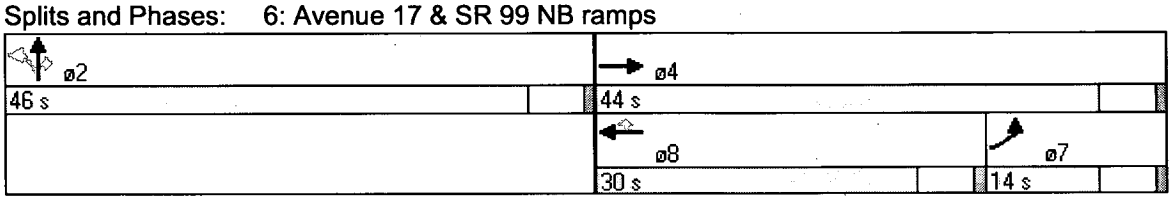
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.956				
Satd. Flow (prot)	1752	3505	0	0	3539	1583	1681	1692	2787	0	0	0
Flt Permitted	0.950						0.950	0.956				
Satd. Flow (perm)	1752	3505	0	0	3539	1583	1681	1692	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						81			434			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	146	404	0	0	782	71	1212	47	382	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	166	459	0	0	889	81	1377	53	434	0	0	0
Lane Group Flow (vph)	166	459	0	0	889	81	696	734	434	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	14.0	44.0	0.0	0.0	30.0	30.0	46.0	46.0	46.0	0.0	0.0	0.0
Total Split (%)	15.6%	48.9%	0.0%	0.0%	33.3%	33.3%	51.1%	51.1%	51.1%	0.0%	0.0%	0.0%
Maximum Green (s)	8.7	38.7			24.7	24.7	40.7	40.7	40.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	10.0	40.6			26.6	26.6	41.4	41.4	41.4			
Actuated g/C Ratio	0.11	0.45			0.30	0.30	0.46	0.46	0.46			
v/c Ratio	0.85	0.29			0.85	0.15	0.90	0.94	0.29			
Control Delay	59.2	9.9			39.3	6.6	39.4	45.8	2.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	59.2	9.9			39.3	6.6	39.4	45.8	2.0			
LOS	E	A			D	A	D	D	A			
Approach Delay		23.0			36.6			33.2				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			D			C				
Queue Length 50th (ft)	84	46			251	0	365	397	0			
Queue Length 95th (ft)	m#168	61			#342	31	#581	#628	24			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	195	1583			1047	526	784	790	1532			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.85	0.29			0.85	0.15	0.89	0.93	0.28			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 84 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 32.3 Intersection LOS: C
Intersection Capacity Utilization 74.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						164			85			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	220	1005	0	0	1388	236	1746	5	1379	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	250	1142	0	0	1577	268	1984	6	1567	0	0	0
Lane Group Flow (vph)	250	1142	0	0	1577	268	992	998	1567	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	17.0	63.0	0.0	0.0	46.0	46.0	57.0	57.0	57.0	0.0	0.0	0.0
Total Split (%)	14.2%	52.5%	0.0%	0.0%	38.3%	38.3%	47.5%	47.5%	47.5%	0.0%	0.0%	0.0%
Maximum Green (s)	11.7	57.7			40.7	40.7	51.7	51.7	51.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	13.0	59.0			42.0	42.0	53.0	53.0	53.0			
Actuated g/C Ratio	0.11	0.49			0.35	0.35	0.44	0.44	0.44			
v/c Ratio	1.30	0.66			1.27	0.41	1.34	1.34	1.23			
Control Delay	177.0	15.7			163.4	13.2	190.7	191.8	138.7			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	177.0	15.7			163.4	13.2	190.7	191.8	138.7			
LOS	F	B			F	B	F	F	F			
Approach Delay		44.7			141.6			168.1				
Approach LOS		D			F			F				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	~248	271			~812	56	~1053	~1061	~831			
Queue Length 95th (ft)	m#156	m186			#919	123	#1275	#1284	#948			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	192	1740			1239	661	742	745	1278			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	1.30	0.66			1.27	0.41	1.34	1.34	1.23			

Intersection Summary

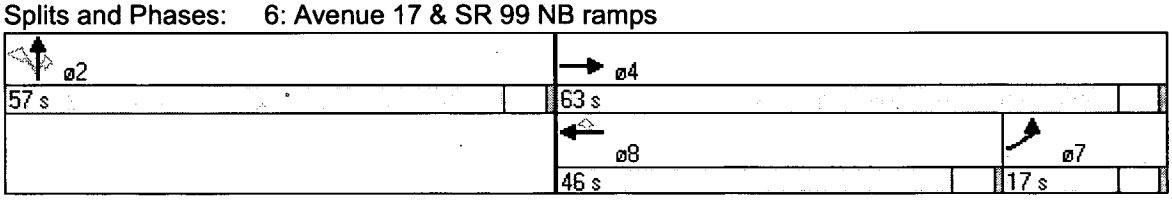
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.34
Intersection Signal Delay: 135.6 Intersection LOS: F
Intersection Capacity Utilization 109.1% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



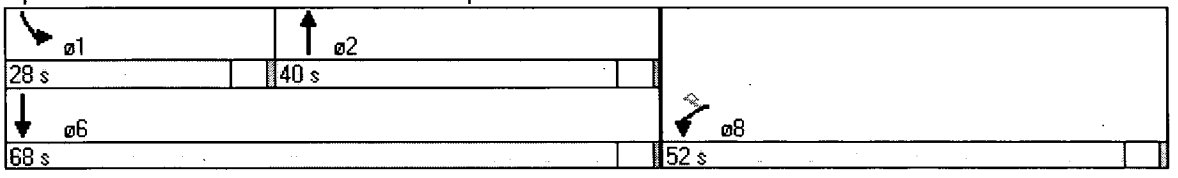
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.889			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1626	1455	1656	0	1770	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1626	1455	1656	0	1770	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		310	196			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	531	299	89	407	276	87
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	603	340	101	462	314	99
Lane Group Flow (vph)	603	340	563	0	314	99
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	52.0	52.0	40.0	0.0	28.0	68.0
Total Split (%)	43.3%	43.3%	33.3%	0.0%	23.3%	56.7%
Maximum Green (s)	47.4	47.4	35.4		23.4	63.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	46.8	46.8	37.5		23.7	65.2
Actuated g/C Ratio	0.39	0.39	0.31		0.20	0.54
v/c Ratio	0.95	0.45	0.86		0.90	0.10
Control Delay	61.4	5.8	12.9		75.9	14.1
Queue Delay	15.5	0.0	28.8		0.0	0.0
Total Delay	77.0	5.8	41.7		75.9	14.1
LOS	E	A	D		E	B
Approach Delay	51.3		41.7			61.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	D		D			E
Queue Length 50th (ft)	440	14	155		239	36
Queue Length 95th (ft)	#644	71	m110		#387	63
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	653	770	660		360	1016
Starvation Cap Reductn	0	0	120		0	0
Spillback Cap Reductn	58	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.01	0.44	1.04		0.87	0.10

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 50.6 Intersection LOS: D
Intersection Capacity Utilization 84.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	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
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.892			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1538	1662	0	1641	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1538	1662	0	1641	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		477	168			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	950	778	143	560	350	131
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	1080	884	162	636	398	149
Lane Group Flow (vph)	1080	884	798	0	398	149
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	56.0	56.0	40.0	0.0	24.0	64.0
Total Split (%)	46.7%	46.7%	33.3%	0.0%	20.0%	53.3%
Maximum Green (s)	51.4	51.4	35.4		19.4	59.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	52.0	52.0	36.0		20.0	60.0
Actuated g/C Ratio	0.43	0.43	0.30		0.17	0.50
v/c Ratio	1.45	0.94	1.30		1.45	0.17
Control Delay	238.9	34.1	153.3		259.5	17.1
Queue Delay	78.3	0.0	289.7		0.0	0.2
Total Delay	317.1	34.1	443.0		259.5	17.3
LOS	F	C	F		F	B
Approach Delay	189.8		443.0			193.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	F		F			F
Queue Length 50th (ft)	~1140	366	~693		~421	61
Queue Length 95th (ft)	#1352	#656	m42		#600	99
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	745	937	616		274	864
Starvation Cap Reductn	0	0	205		0	0
Spillback Cap Reductn	80	0	0		0	288
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.62	0.94	1.94		1.45	0.26

Intersection Summary

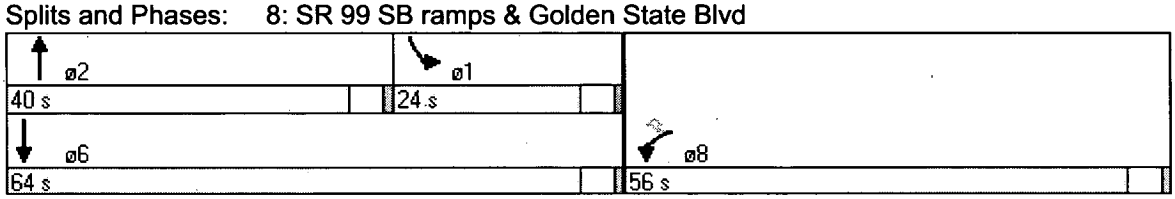
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 115 (96%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.45
Intersection Signal Delay: 251.5 Intersection LOS: F
Intersection Capacity Utilization 124.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.947			0.853				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		26			393				84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	242	296	24	113	446	246	70	8	406	523	18	77
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	263	322	26	123	485	267	76	9	441	568	20	84
Lane Group Flow (vph)	263	322	26	123	752	0	76	450	0	568	20	84
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	19.0	45.0	45.0	20.4	46.4	0.0	16.8	20.6	0.0	34.0	37.8	37.8
Total Split (%)	15.8%	37.5%	37.5%	17.0%	38.7%	0.0%	14.0%	17.2%	0.0%	28.3%	31.5%	31.5%
Maximum Green (s)	14.4	40.4	40.4	15.8	41.8		12.2	16.0		29.4	33.2	33.2
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	15.0	47.8	47.8	13.7	46.5		10.7	12.5		30.0	33.9	33.9
Actuated g/C Ratio	0.12	0.40	0.40	0.11	0.39		0.09	0.10		0.25	0.28	0.28
v/c Ratio	1.28	0.47	0.04	0.63	1.12		0.53	0.89		1.32	0.04	0.17
Control Delay	201.4	31.3	9.8	63.8	101.5		65.1	29.9		194.3	29.1	6.9
Queue Delay	25.7	0.3	0.0	0.0	26.1		0.0	1.9		53.7	0.0	0.0
Total Delay	227.1	31.6	9.8	63.8	127.5		65.1	31.8		248.0	29.1	6.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	C	A	E	F		E	C		F	C	A
Approach Delay		114.8			118.6			36.6			211.4	
Approach LOS		F			F			D			F	
Queue Length 50th (ft)	~259	188	0	97	~688		57	41		~553	7	6
Queue Length 95th (ft)	#428	296	20	m154	#943		108	#215		m#625	m9	m9
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	205	688	600	233	673		172	539		430	533	513
Starvation Cap Reductn	0	0	0	0	0		0	0		36	0	0
Spillback Cap Reductn	9	86	0	0	35		0	26		9	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.34	0.53	0.04	0.53	1.18		0.44	0.88		1.44	0.04	0.16

Intersection Summary

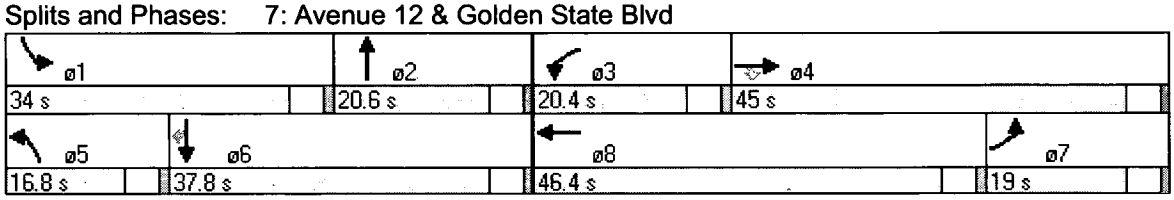
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 124.9 Intersection LOS: F
Intersection Capacity Utilization 119.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.957			0.857				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		18			279				70
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	420	409	14	138	652	260	149	23	466	1005	12	64
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	457	445	15	150	709	283	162	25	507	1092	13	70
Lane Group Flow (vph)	457	445	15	150	992	0	162	532	0	1092	13	70
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	19.0	43.6	43.6	18.4	43.0	0.0	24.1	21.0	0.0	37.0	33.9	33.9
Total Split (%)	15.8%	36.3%	36.3%	15.3%	35.8%	0.0%	20.1%	17.5%	0.0%	30.8%	28.3%	28.3%
Maximum Green (s)	14.4	39.0	39.0	13.8	38.4		19.5	16.4		32.4	29.3	29.3
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	15.0	40.3	40.3	13.7	39.0		42.6	17.0		33.0	7.4	7.4
Actuated g/C Ratio	0.12	0.34	0.34	0.11	0.32		0.36	0.14		0.28	0.06	0.06
v/c Ratio	2.17	0.75	0.03	0.77	1.74		0.27	1.17		2.35	0.12	0.44
Control Delay	566.1	44.7	12.0	77.0	360.9		29.6	119.6		630.5	72.8	35.8
Queue Delay	145.6	0.8	0.0	0.0	28.5		0.0	139.6		63.9	0.0	0.0
Total Delay	711.8	45.5	12.0	77.0	389.3		29.6	259.2		694.4	72.8	35.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D	B	E	F		C	F		F	E	D
Approach Delay		377.0			348.3			205.6			648.3	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~567	307	0	118	~1127		88	~293		~1372	11	24
Queue Length 95th (ft)	#773	436	16	m142	m#934		151	#513		m#925	m11	m16
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	211	596	516	204	570		598	455		464	443	429
Starvation Cap Reductn	0	0	0	0	0		0	0		18	0	0
Spillback Cap Reductn	95	30	0	0	20		0	97		248	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	3.94	0.79	0.03	0.74	1.80		0.27	1.49		5.06	0.03	0.16

Intersection Summary

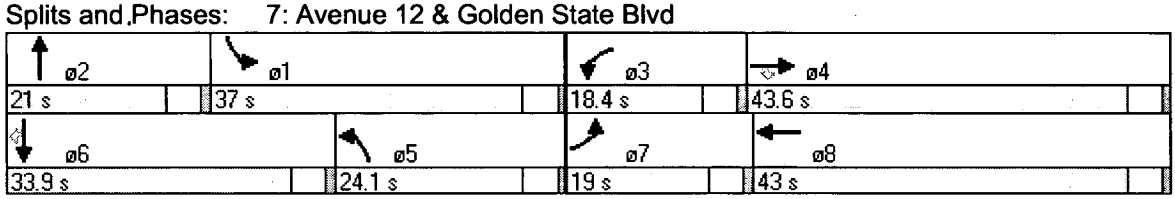
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 6 (5%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.35
Intersection Signal Delay: 419.5 Intersection LOS: F
Intersection Capacity Utilization 172.5% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						843			86			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	106	1119	0	0	559	1078	245	11	409	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	120	1272	0	0	635	1225	278	12	465	0	0	0
Lane Group Flow (vph)	120	1272	0	0	635	1225	0	290	465	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	12.8	84.0	0.0	0.0	71.2	71.2	36.0	36.0	36.0	0.0	0.0	0.0
Total Split (%)	10.7%	70.0%	0.0%	0.0%	59.3%	59.3%	30.0%	30.0%	30.0%	0.0%	0.0%	0.0%
Maximum Green (s)	8.2	79.4			66.6	66.6	31.4	31.4	31.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	8.8	80.0			67.2	67.2		32.0	32.0			
Actuated g/C Ratio	0.07	0.67			0.56	0.56		0.27	0.27			
v/c Ratio	0.94	1.03			0.62	0.99		0.67	1.04			
Control Delay	93.0	44.5			21.2	31.9		48.3	88.3			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	93.0	44.5			21.2	31.9		48.3	88.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D			C	C		D	F			
Approach Delay		48.7			28.3			72.9				
Approach LOS		D			C			E				
Queue Length 50th (ft)	90	~707			316	425		201	~337			
Queue Length 95th (ft)	m#109	m609			422	#878		293	#525			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	128	1230			1023	1241		431	448			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.94	1.03			0.62	0.99		0.67	1.04			

Intersection Summary

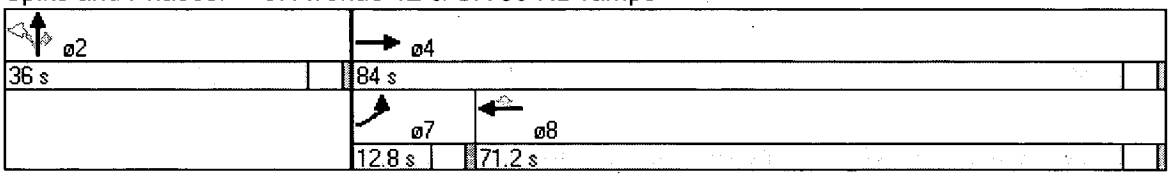
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 8 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 43.8 Intersection LOS: D
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						901			12			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	126	1752	0	0	759	1569	292	3	658	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	143	1991	0	0	862	1783	332	3	748	0	0	0
Lane Group Flow (vph)	143	1991	0	0	862	1783	0	335	748	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	13.0	77.0	0.0	0.0	64.0	64.0	43.0	43.0	43.0	0.0	0.0	0.0
Total Split (%)	10.8%	64.2%	0.0%	0.0%	53.3%	53.3%	35.8%	35.8%	35.8%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	72.4			59.4	59.4	38.4	38.4	38.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	73.0			60.0	60.0		39.0	39.0			
Actuated g/C Ratio	0.08	0.61			0.50	0.50		0.32	0.32			
v/c Ratio	1.11	1.81			0.95	1.46		0.62	1.53			
Control Delay	111.7	386.8			49.9	228.9		40.3	277.7			
Queue Delay	0.0	1.5			0.0	0.0		0.0	0.0			
Total Delay	111.7	388.3			49.9	228.9		40.3	277.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			D	F		D	F			
Approach Delay		369.7			170.5			204.2				
Approach LOS		F			F			F				
Queue Length 50th (ft)	~129	~2379			617	~1531		219	~811			
Queue Length 95th (ft)	m86	m#1328			#870	#1728		312	#1020			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	129	1101			905	1220		540	490			
Starvation Cap Reductn	0	2			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	1.11	1.81			0.95	1.46		0.62	1.53			

Intersection Summary

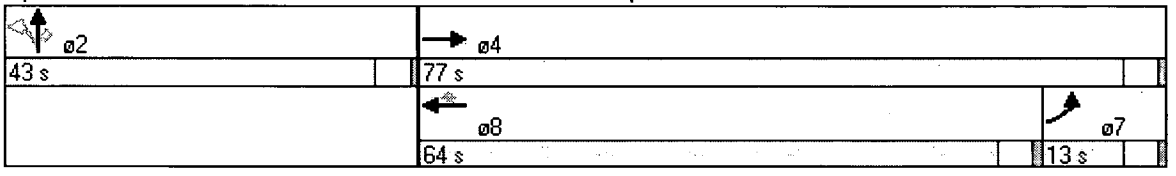
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.81
Intersection Signal Delay: 249.3 Intersection LOS: F
Intersection Capacity Utilization 139.6% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2030
Analysis Time Period	2030 Project AM Alt C		

Project Description

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	18	300	1	53	289	13
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	16	8	14	2	20	49
Percent Heavy Vehicles	11	–	–	19	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	15	8	13	2	19	46
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	57	314	14	19	326	1
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	19	57		71			38	
C (m) (veh/h)	1183	1143		495			338	
v/c	0.02	0.05		0.14			0.11	
95% queue length	0.05	0.16		0.50			0.38	
Control Delay (s/veh)	8.1	8.3		13.5			17.0	
LOS	A	A		B			C	
Approach Delay (s/veh)	–	–	13.5			17.0		
Approach LOS	–	–	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2030 Project PM Alt C		

Project Description 04-837.1

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	25	444	5	96	457	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	13	11	9	3	13	121
Percent Heavy Vehicles	13	–	–	15	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	12	11	9	3	12	112
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	104	496	10	27	482	5
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	27	104		137			33	
C (m) (veh/h)	1005	1012		432			139	
v/c	0.03	0.10		0.32			0.24	
95% queue length	0.08	0.34		1.34			0.88	
Control Delay (s/veh)	8.7	9.0		17.2			38.8	
LOS	A	A		C			E	
Approach Delay (s/veh)	–	–	17.2			38.8		
Approach LOS	–	–	C			E		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/13/2006 4:49 PM

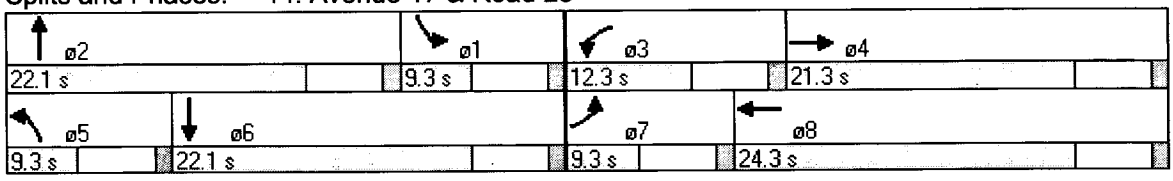
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.921			0.964			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1824	0	1770	1716	0	1770	1796	0	1770	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1824	0	1770	1716	0	1770	1796	0	1770	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			36			24			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	5	51	8	132	29	33	5	277	88	75	196	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	55	9	143	32	36	5	301	96	82	213	5
Lane Group Flow (vph)	5	64	0	143	68	0	5	397	0	82	218	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	12.3	24.3	0.0	9.3	22.1	0.0	9.3	22.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	18.9%	37.4%	0.0%	14.3%	34.0%	0.0%	14.3%	34.0%	0.0%
Maximum Green (s)	4.0	16.0		7.0	19.0		4.0	16.8		4.0	16.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.8	9.4		9.4	16.3		5.8	31.1		5.8	35.2	
Actuated g/C Ratio	0.08	0.14		0.15	0.25		0.08	0.50		0.09	0.57	
v/c Ratio	0.03	0.24		0.55	0.15		0.03	0.43		0.53	0.21	
Control Delay	26.4	20.2		30.2	9.7		26.4	15.4		37.5	10.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.4	20.2		30.2	9.7		26.4	15.4		37.5	10.5	
LOS	C	C		C	A		C	B		D	B	
Approach Delay		20.7			23.6			15.5			17.9	
Approach LOS		C			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	2	16		45	7		2	105		27	39	
Queue Length 95th (ft)	10	44		#108	35		10	#211		#75	109	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	146	458		259	586		146	913		156	1054	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.03	0.14		0.55	0.12		0.03	0.43		0.53	0.21	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 62.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 18.3 Intersection LOS: B
Intersection Capacity Utilization 48.1% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



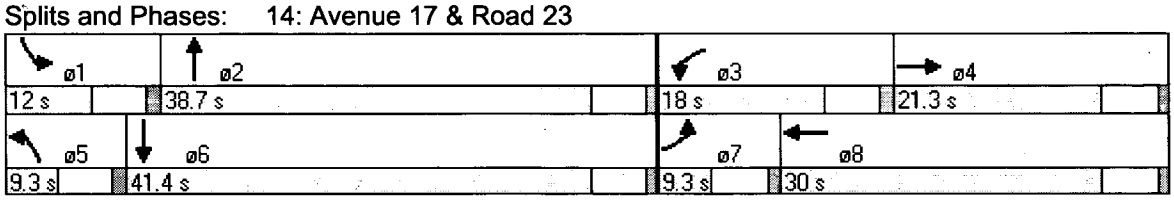
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.912			0.943			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1820	0	1770	1699	0	1770	1757	0	1770	1853	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1820	0	1770	1699	0	1770	1757	0	1770	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			79			40			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	11	99	18	189	61	86	4	326	201	97	320	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	108	20	205	66	93	4	354	218	105	348	11
Lane Group Flow (vph)	12	128	0	205	159	0	4	572	0	105	359	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	18.0	30.0	0.0	9.3	38.7	0.0	12.0	41.4	0.0
Total Split (%)	10.3%	23.7%	0.0%	20.0%	33.3%	0.0%	10.3%	43.0%	0.0%	13.3%	46.0%	0.0%
Maximum Green (s)	4.0	16.0		12.7	24.7		4.0	33.4		6.7	36.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	11.9		13.0	24.4		5.3	38.5		7.9	46.0	
Actuated g/C Ratio	0.06	0.14		0.16	0.30		0.06	0.47		0.09	0.56	
v/c Ratio	0.11	0.48		0.73	0.28		0.04	0.67		0.64	0.34	
Control Delay	43.8	36.9		50.4	13.0		41.8	24.6		56.5	13.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	43.8	36.9		50.4	13.0		41.8	24.6		56.5	13.7	
LOS	D	D		D	B		D	C		E	B	
Approach Delay		37.5			34.1			24.8			23.4	
Approach LOS		D			C			C			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	6	59		104	28		2	239		55	99	
Queue Length 95th (ft)	24	111		#215	83		13	#446		#133	219	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	106	360		301	620		106	848		168	1041	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.36		0.68	0.26		0.04	0.67		0.63	0.34	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 81.9
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 27.7 Intersection LOS: C
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



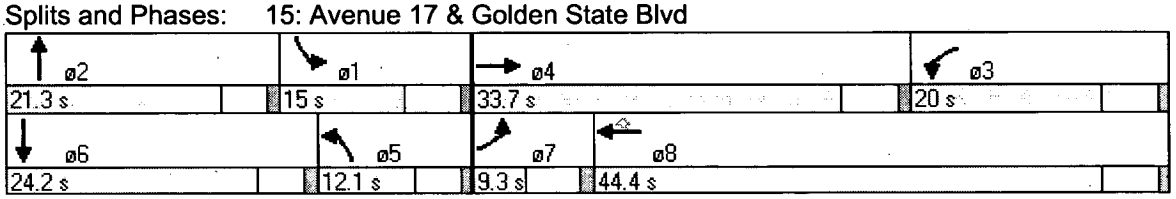
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.990				0.850		0.866			0.918	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1736	3471	1553	1492	1360	0	3433	1710	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3504	0	1736	3471	1553	1492	1360	0	3433	1710	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				500		285			18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	37	841	62	231	998	460	49	32	262	308	14	17
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	40	914	67	251	1085	500	53	35	285	335	15	18
Lane Group Flow (vph)	40	981	0	251	1085	500	53	320	0	335	33	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	33.7	0.0	20.0	44.4	44.4	12.1	21.3	0.0	15.0	24.2	0.0
Total Split (%)	10.3%	37.4%	0.0%	22.2%	49.3%	49.3%	13.4%	23.7%	0.0%	16.7%	26.9%	0.0%
Maximum Green (s)	4.0	28.4		14.7	39.1	39.1	7.5	16.7		9.7	19.6	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	29.7		16.0	44.1	44.1	7.5	17.3		11.0	25.0	
Actuated g/C Ratio	0.06	0.33		0.18	0.49	0.49	0.08	0.19		0.12	0.28	
v/c Ratio	0.38	0.84		0.81	0.64	0.49	0.43	0.65		0.80	0.07	
Control Delay	51.8	36.0		46.1	14.0	3.0	49.9	13.1		53.9	17.5	
Queue Delay	0.0	0.0		0.0	0.2	0.2	0.0	0.0		0.0	0.0	
Total Delay	51.8	36.0		46.1	14.2	3.2	49.9	13.1		53.9	17.5	
LOS	D	D		D	B	A	D	B		D	B	
Approach Delay		36.6			15.6			18.3			50.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			B			B			D	
Queue Length 50th (ft)	22	267		131	236	50	29	17		96	7	
Queue Length 95th (ft)	55	#355		m#241	292	m49	66	101		#162	30	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	104	1162		309	1702	1016	134	492		420	489	
Starvation Cap Reductn	0	0		0	119	96	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.38	0.84		0.81	0.69	0.54	0.40	0.65		0.80	0.07	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 25.4 Intersection LOS: C
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.994				0.850		0.864			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3518	0	1656	3312	1482	1736	1578	0	3433	1704	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3518	0	1656	3312	1482	1736	1578	0	3433	1704	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				542		251			46	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	56	1598	71	334	1507	698	110	48	476	777	32	42
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	61	1737	77	363	1638	759	120	52	517	845	35	46
Lane Group Flow (vph)	61	1814	0	363	1638	759	120	569	0	845	81	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	48.0	0.0	21.0	59.7	59.7	19.9	28.0	0.0	23.0	31.1	0.0
Total Split (%)	7.8%	40.0%	0.0%	17.5%	49.8%	49.8%	16.6%	23.3%	0.0%	19.2%	25.9%	0.0%
Maximum Green (s)	4.0	42.7		15.7	54.4	54.4	15.3	23.4		17.7	26.5	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	44.0		17.0	57.6	57.6	13.3	24.0		19.0	29.7	
Actuated g/C Ratio	0.04	0.37		0.14	0.48	0.48	0.11	0.20		0.16	0.25	
v/c Ratio	0.78	1.40		1.54	1.03	0.76	0.62	1.10		1.55	0.18	
Control Delay	110.9	218.0		285.3	47.0	7.6	64.7	96.2		292.6	19.5	
Queue Delay	0.0	59.8		0.0	81.1	2.6	0.0	207.7		0.0	0.0	
Total Delay	110.9	277.9		285.3	128.1	10.2	64.7	304.0		292.6	19.5	
LOS	F	F		F	F	B	E	F		F	B	
Approach Delay		272.4			116.4			262.3			268.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	48	~996		~397	~733	96	90	~335		~476	21	
Queue Length 95th (ft)	#127	#1138		m#353	m559	m79	151	#560		#601	64	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	78	1292		235	1588	993	230	516		544	456	
Starvation Cap Reductn	0	0		0	249	133	0	0		0	0	
Spillback Cap Reductn	0	112		0	0	0	0	155		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.78	1.54		1.54	1.22	0.88	0.52	1.58		1.55	0.18	

Intersection Summary

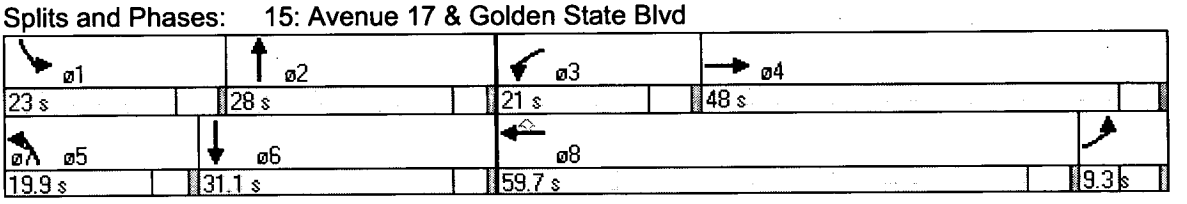
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 100 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.55
Intersection Signal Delay: 201.9 Intersection LOS: F
Intersection Capacity Utilization 132.4% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.874			0.872			0.994			0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1538	0	1671	1534	0	1770	3518	0	1770	3507	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1538	0	1671	1534	0	1770	3518	0	1770	3507	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		77			159			6			9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	73	14	71	59	26	146	172	1179	45	132	368	25
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
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	79	15	77	64	28	159	187	1282	49	143	400	27
Lane Group Flow (vph)	79	92	0	64	187	0	187	1331	0	143	427	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	9.0	20.9	0.0	20.0	38.1	0.0	12.0	30.1	0.0
Total Split (%)	11.3%	26.1%	0.0%	11.3%	26.1%	0.0%	25.0%	47.6%	0.0%	15.0%	37.6%	0.0%
Maximum Green (s)	4.1	16.0		4.1	16.0		15.1	33.2		7.1	25.2	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	8.9		5.0	8.9		12.6	34.6		8.1	34.2	
Actuated g/C Ratio	0.07	0.13		0.07	0.13		0.18	0.51		0.12	0.50	
v/c Ratio	0.66	0.35		0.53	0.56		0.59	0.74		0.68	0.24	
Control Delay	61.5	13.8		51.6	14.6		34.2	18.9		49.9	15.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	61.5	13.8		51.6	14.6		34.2	18.9		49.9	15.2	
LOS	E	B		D	B		C	B		D	B	
Approach Delay		35.9			24.0			20.8			23.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	34	6		28	11		75	239		61	62	
Queue Length 95th (ft)	#109	44		#87	65		143	#392		#161	116	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	120	394		120	457		385	1815		212	1769	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.66	0.23		0.53	0.41		0.49	0.73		0.67	0.24	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 68
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 69.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26

ø2	ø1	ø3	ø4
38.1 s	12 s	9 s	20.9 s

ø5	ø6	ø7	ø8
20 s	30.1 s	9 s	20.9 s

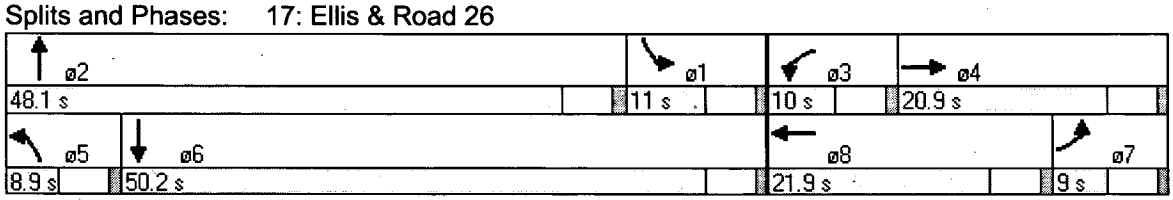
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.954			0.869			0.978			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1777	0	1770	1619	0	1770	3461	0	1770	3419	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1777	0	1770	1619	0	1770	3461	0	1770	3419	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			179			31			62	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	65	118	52	74	39	269	35	1192	207	98	1020	297
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	128	57	80	42	292	38	1296	225	107	1109	323
Lane Group Flow (vph)	71	185	0	80	334	0	38	1521	0	107	1432	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	10.0	21.9	0.0	8.9	48.1	0.0	11.0	50.2	0.0
Total Split (%)	10.0%	23.2%	0.0%	11.1%	24.3%	0.0%	9.9%	53.4%	0.0%	12.2%	55.8%	0.0%
Maximum Green (s)	4.1	16.0		5.1	17.0		4.0	43.2		6.1	45.3	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	13.2		6.3	13.8		5.2	40.9		7.3	44.1	
Actuated g/C Ratio	0.07	0.17		0.08	0.18		0.06	0.53		0.09	0.57	
v/c Ratio	0.59	0.58		0.58	0.77		0.34	0.83		0.66	0.73	
Control Delay	62.6	37.1		58.4	29.2		49.5	23.0		61.5	16.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	62.6	37.1		58.4	29.2		49.5	23.0		61.5	16.9	
LOS	E	D		E	C		D	C		E	B	
Approach Delay		44.2			34.8			23.6			20.0	
Approach LOS		D			C			C			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	40	84		44	80		21	366		59	305	
Queue Length 95th (ft)	#112	151		#116	#185		53	#512		#150	417	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	121	405		139	509		112	1921		162	2041	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.59	0.46		0.58	0.66		0.34	0.79		0.66	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 77.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 24.8 Intersection LOS: C
Intersection Capacity Utilization 80.6% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 Project AM Alt C		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	370	8	1	346	24
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	1	1	34	1	30
Percent Heavy Vehicles	8	–	–	10	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	32	1	28
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	376	26	1	402	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		65			3	
C (m) (veh/h)	1125	1107		381			363	
v/c	0.00	0.00		0.17			0.01	
95% queue length	0.00	0.00		0.61			0.02	
Control Delay (s/veh)	8.2	8.3		16.4			15.0	
LOS	A	A		C			B	
Approach Delay (s/veh)	–	–	16.4			15.0		
Approach LOS	–	–	C			B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/13/2006 4:46 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 Project PM Alt C		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	535	33	1	507	111
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	2	2	41	3	47
Percent Heavy Vehicles	17	–	–	9	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	2	2	38	3	44
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	551	120	2	581	35
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	2	1		91			5	
C (m) (veh/h)	853	931		242			166	
v/c	0.00	0.00		0.38			0.03	
95% queue length	0.01	0.00		1.66			0.09	
Control Delay (s/veh)	9.2	8.9		28.6			27.4	
LOS	A	A		D			D	
Approach Delay (s/veh)	–	–	28.6			27.4		
Approach LOS	–	–	D			D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 9/13/2006 4:47 PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.972			0.943			0.987			0.939	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1759	0	1626	1614	0	1504	1563	0	1570	1551	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1759	0	1626	1614	0	1504	1563	0	1570	1551	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			46			7			56	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	25	126	29	9	114	69	18	151	14	43	101	69
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	27	137	32	10	124	75	20	164	15	47	110	75
Lane Group Flow (vph)	27	169	0	10	199	0	20	179	0	47	185	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.8	0.0	10.6	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	36.6%	0.0%	16.3%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.5		5.3	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	13.5		5.5	11.9		5.5	28.3		6.7	30.2	
Actuated g/C Ratio	0.09	0.25		0.09	0.22		0.09	0.54		0.11	0.58	
v/c Ratio	0.17	0.37		0.07	0.51		0.14	0.21		0.26	0.20	
Control Delay	28.6	16.2		28.7	18.6		30.2	13.1		28.8	8.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.6	16.2		28.7	18.6		30.2	13.1		28.8	8.4	
LOS	C	B		C	B		C	B		C	A	
Approach Delay		17.9			19.1			14.8			12.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	5	27		2	27		4	17		9	12	
Queue Length 95th (ft)	32	96		17	103		27	102		46	83	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	161	582		149	517		138	853		181	925	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.29		0.07	0.38		0.14	0.21		0.26	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 52
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 39.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
10.6 s	23.8 s	9.3 s	21.3 s
ø5	**ø6**	**ø7**	**ø8**
9.3 s	25.1 s	9.3 s	21.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949			0.932			0.991			0.955	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1670	0	1736	1703	0	1703	1776	0	1556	1564	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1670	0	1736	1703	0	1703	1776	0	1556	1564	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			62			5			35	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	65	89	46	15	154	127	51	232	16	95	220	93
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	71	97	50	16	167	138	55	252	17	103	239	101
Lane Group Flow (vph)	71	147	0	16	305	0	55	269	0	103	340	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.1	0.0	11.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	35.5%	0.0%	17.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	17.8		6.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	17.0		5.3	13.6		5.3	23.1		7.3	26.9	
Actuated g/C Ratio	0.08	0.29		0.08	0.23		0.08	0.39		0.12	0.46	
v/c Ratio	0.50	0.29		0.11	0.69		0.38	0.38		0.55	0.46	
Control Delay	42.0	13.5		31.7	25.1		36.0	18.7		39.7	16.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	42.0	13.5		31.7	25.1		36.0	18.7		39.7	16.8	
LOS	D	B		C	C		D	B		D	B	
Approach Delay		22.8			25.4			21.6			22.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	27	26		6	83		21	83		38	96	
Queue Length 95th (ft)	#75	76		23	158		53	152		#99	183	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	142	582		140	520		144	701		188	734	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.50	0.25		0.11	0.59		0.38	0.38		0.55	0.46	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 58.8
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 53.4% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
11.3 s	23.1 s	9.3 s	21.3 s
ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.960			0.914			0.889			0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3398	0	3433	3235	0	1752	3116	0	2575	1302	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3398	0	3433	3235	0	1752	3116	0	2575	1302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61			412			464			51	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	165	377	136	388	306	409	108	150	427	269	106	88
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	36%	36%	36%
Adj. Flow (vph)	179	410	148	422	333	445	117	163	464	292	115	96
Lane Group Flow (vph)	179	558	0	422	778	0	117	627	0	292	211	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	17.0	24.1	0.0	18.0	25.1	0.0	13.0	20.9	0.0	17.0	24.9	0.0
Total Split (%)	21.3%	30.1%	0.0%	22.5%	31.4%	0.0%	16.3%	26.1%	0.0%	21.3%	31.1%	0.0%
Maximum Green (s)	12.1	19.2		13.1	20.2		8.1	16.0		12.1	20.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.0	25.1		14.6	26.7		8.6	11.8		12.5	17.9	
Actuated g/C Ratio	0.16	0.31		0.18	0.33		0.11	0.15		0.16	0.22	
v/c Ratio	0.62	0.50		0.67	0.57		0.62	0.73		0.72	0.64	
Control Delay	41.8	23.1		28.8	7.7		49.4	13.8		43.4	30.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	41.8	23.1		28.8	7.7		49.4	13.8		43.4	30.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C		C	A		D	B		D	C	
Approach Delay		27.7			15.1			19.4			38.1	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	84	111		87	85		57	38		71	75	
Queue Length 95th (ft)	#153	168		m115	m41		#120	84		#121	138	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	288	1106		646	1354		197	1024		418	379	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.62	0.50		0.65	0.57		0.59	0.61		0.70	0.56	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 69.7% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Ellis Ave & Golden State Blvd

ø1	ø2	ø3	ø4
17 s	20.9 s	18 s	24.1 s

ø5	ø6	ø8	ø7
13 s	24.9 s	25.1 s	17 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.958			0.920			0.883			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	3433	3256	0	1597	2821	0	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	3433	3256	0	1597	2821	0	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			265			479			25	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	202	581	227	837	496	571	191	254	909	407	184	120
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	220	632	247	910	539	621	208	276	988	442	200	130
Lane Group Flow (vph)	220	879	0	910	1160	0	208	1264	0	442	330	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	19.9	33.0	0.0	32.0	45.1	0.0	24.2	37.0	0.0	18.0	30.8	0.0
Total Split (%)	16.6%	27.5%	0.0%	26.7%	37.6%	0.0%	20.2%	30.8%	0.0%	15.0%	25.7%	0.0%
Maximum Green (s)	15.0	28.1		27.1	40.2		19.3	32.1		13.1	25.9	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	15.9	29.0		28.0	41.1		22.4	33.0		14.0	24.6	
Actuated g/C Ratio	0.13	0.24		0.23	0.34		0.19	0.28		0.12	0.20	
v/c Ratio	0.94	1.03		1.14	0.90		0.70	1.34dr		1.10	0.87	
Control Delay	96.3	81.0		98.7	21.5		60.2	94.1		124.3	65.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	96.3	81.0		98.7	21.5		60.2	94.1		124.3	65.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F		F	C		E	F		F	E	
Approach Delay		84.1			55.4			89.3			99.1	
Approach LOS		F			E			F			F	
Queue Length 50th (ft)	171	~368		~421	215		156	~445		~201	226	
Queue Length 95th (ft)	#325	#500		m#432	m236		#273	#585		#305	#371	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	235	854		801	1289		298	1123		401	411	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.94	1.03		1.14	0.90		0.70	1.13		1.10	0.80	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 76.7 Intersection LOS: E
Intersection Capacity Utilization 108.6% ICU Level of Service G
Analysis Period (min) 15

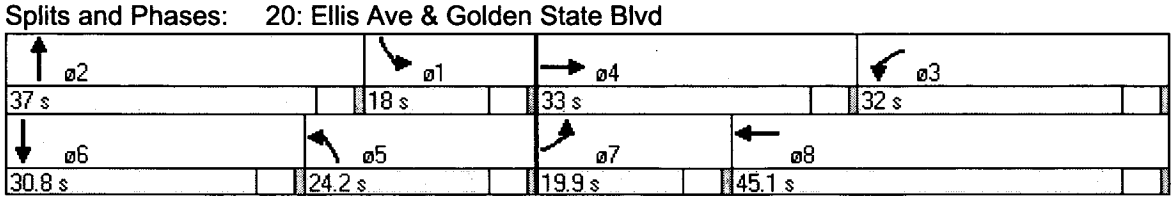
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



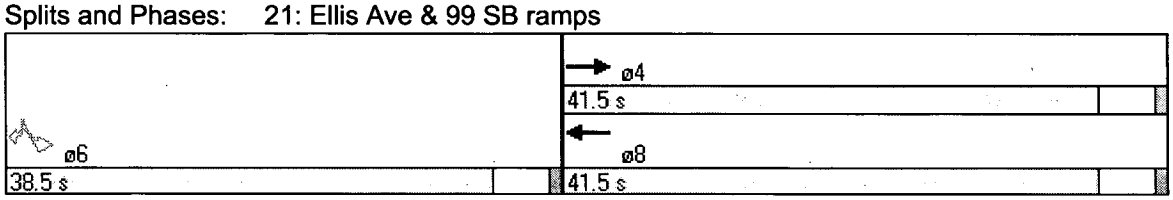
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												139
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1069	0	0	673	0	0	0	0	350	0	429
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
Heavy Vehicles (%)	3%	3%	3%	14%	14%	14%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	1162	0	0	732	0	0	0	0	380	0	466
Lane Group Flow (vph)	0	1162	0	0	732	0	0	0	0	380	0	466
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	41.5	0.0	0.0	41.5	0.0	0.0	0.0	0.0	38.5	0.0	38.5
Total Split (%)	0.0%	51.9%	0.0%	0.0%	51.9%	0.0%	0.0%	0.0%	0.0%	48.1%	0.0%	48.1%
Maximum Green (s)		36.6			36.6					33.6		33.6
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		47.1			47.1					24.9		24.9
Actuated g/C Ratio		0.59			0.59					0.31		0.31
v/c Ratio		0.56			0.39					0.72		0.82
Control Delay		7.0			6.0					31.4		29.0
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		7.0			6.0					31.4		29.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			A					C		C
Approach Delay		7.0			6.0							
Approach LOS		A			A							
Queue Length 50th (ft)		51			43					166		151
Queue Length 95th (ft)		220			m154					215		223
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2065			1866					734		736
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.56			0.39					0.52		0.63

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 76 (95%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 13.8 Intersection LOS: B
Intersection Capacity Utilization 78.2% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
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
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Flt Permitted										0.950		
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												43
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1897	0	0	1108	0	0	0	0	568	0	796
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	2062	0	0	1204	0	0	0	0	617	0	865
Lane Group Flow (vph)	0	2062	0	0	1204	0	0	0	0	617	0	865
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	64.0	0.0	0.0	64.0	0.0	0.0	0.0	0.0	56.0	0.0	56.0
Total Split (%)	0.0%	53.3%	0.0%	0.0%	53.3%	0.0%	0.0%	0.0%	0.0%	46.7%	0.0%	46.7%
Maximum Green (s)		59.1			59.1					51.1		51.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		60.0			60.0					52.0		52.0
Actuated g/C Ratio		0.50			0.50					0.43		0.43
v/c Ratio		1.16			0.68					0.82		1.24
Control Delay		93.5			10.9					40.6		150.5
Queue Delay		0.0			0.8					0.0		0.0
Total Delay		93.5			11.7					40.6		150.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			B					D		F
Approach Delay		93.5			11.7							
Approach LOS		F			B							
Queue Length 50th (ft)		~993			314					412		~817
Queue Length 95th (ft)		m#847			m192					#585		#1066
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		1770			1770					752		697
Starvation Cap Reductn		0			264					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		1.16			0.80					0.82		1.24

Intersection Summary

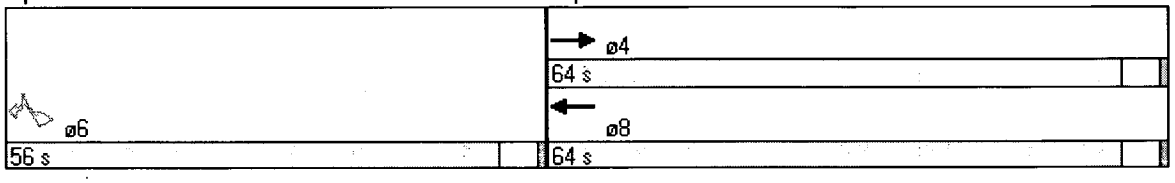
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 76.3 Intersection LOS: E
Intersection Capacity Utilization 126.9% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
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
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.939				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1736	3471	0	0	3110	0	3273	0	1509	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1736	3471	0	0	3110	0	3273	0	1509	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					213				322			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	538	516	0	0	544	372	402	0	296	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	9%	9%	9%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	585	561	0	0	591	404	437	0	322	0	0	0
Lane Group Flow (vph)	585	561	0	0	995	0	437	0	322	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	32.0	59.1	0.0	0.0	27.1	0.0	20.9	0.0	20.9	0.0	0.0	0.0
Total Split (%)	40.0%	73.9%	0.0%	0.0%	33.9%	0.0%	26.1%	0.0%	26.1%	0.0%	0.0%	0.0%
Maximum Green (s)	27.1	54.2			22.2		16.0		16.0			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	28.4	56.3			23.9		15.7		15.7			
Actuated g/C Ratio	0.36	0.70			0.30		0.20		0.20			
v/c Ratio	0.95	0.23			0.92		0.68		0.58			
Control Delay	45.6	3.6			37.1		35.5		8.1			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	45.6	3.6			37.1		35.5		8.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			D		D		A			
Approach Delay		25.0			37.1							
Approach LOS		C			D							
Queue Length 50th (ft)	255	27			207		103		0			
Queue Length 95th (ft)	#476	35			#338		150		65			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	617	2443			1078		691		573			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	0.95	0.23			0.92		0.63		0.56			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 28.9 Intersection LOS: C
Intersection Capacity Utilization 78.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 22: Ellis Ave & 99 NB ramps

ø2	ø4		
20.9 s	59.1 s		
	ø7	ø8	
	32 s	27.1 s	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
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
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.944				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3309	0	3433	0	1583	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3309	0	3433	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					111				232			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	970	837	0	0	978	580	614	0	455	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1054	910	0	0	1063	630	667	0	495	0	0	0
Lane Group Flow (vph)	1054	910	0	0	1693	0	667	0	495	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	50.0	96.0	0.0	0.0	46.0	0.0	24.0	0.0	24.0	0.0	0.0	0.0
Total Split (%)	41.7%	80.0%	0.0%	0.0%	38.3%	0.0%	20.0%	0.0%	20.0%	0.0%	0.0%	0.0%
Maximum Green (s)	45.1	91.1			41.1		19.1		19.1			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	46.0	92.0			42.0		20.0		20.0			
Actuated g/C Ratio	0.38	0.77			0.35		0.17		0.17			
v/c Ratio	1.55	0.34			1.38		1.17		1.08			
Control Delay	272.0	3.1			205.2		136.7		91.8			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	272.0	3.1			205.2		136.7		91.8			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	A			F		F		F			
Approach Delay		147.4			205.2							
Approach LOS		F			F							
Queue Length 50th (ft)	~1146	79			~889		~316		~269			
Queue Length 95th (ft)	m#1018	m86			#1031		#435		#484			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	679	2713			1230		572		457			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	1.55	0.34			1.38		1.17		1.08			

Intersection Summary

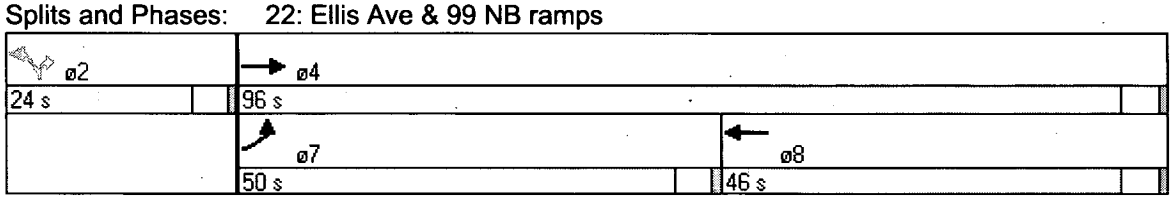
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.55
Intersection Signal Delay: 160.5 Intersection LOS: F
Intersection Capacity Utilization 126.9% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



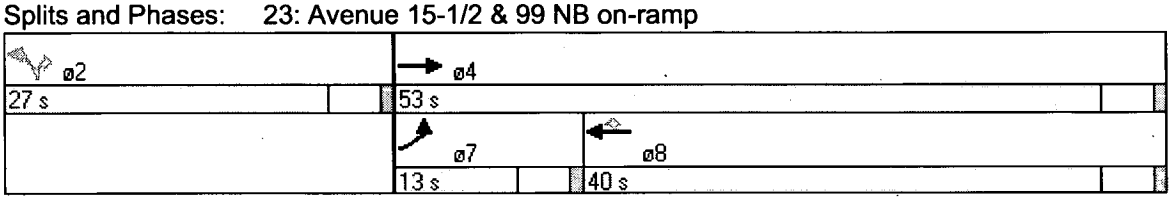
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						505			117			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	288	950	0	0	1299	465	386	0	468	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	313	1033	0	0	1412	505	420	0	509	0	0	0
Lane Group Flow (vph)	313	1033	0	0	1412	505	420	0	509	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	13.0	53.0	0.0	0.0	40.0	40.0	27.0	0.0	27.0	0.0	0.0	0.0
Total Split (%)	16.3%	66.3%	0.0%	0.0%	50.0%	50.0%	33.8%	0.0%	33.8%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	48.4			35.4	35.4	22.4		22.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	9.0	49.0			36.0	36.0	23.0		23.0			
Actuated g/C Ratio	0.11	0.61			0.45	0.45	0.29		0.29			
v/c Ratio	0.81	0.48			0.90	0.52	0.45		0.99			
Control Delay	54.7	1.9			30.4	3.5	25.2		62.4			
Queue Delay	0.0	0.1			0.0	0.0	0.0		0.0			
Total Delay	54.7	2.0			30.4	3.5	25.2		62.4			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			C	A	C		E			
Approach Delay		14.2			23.3							
Approach LOS		B			C							
Queue Length 50th (ft)	67	11			331	0	88		203			
Queue Length 95th (ft)	#140	24			#480	51	129		#408			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	386	2168			1562	977	932		513			
Starvation Cap Reductn	0	234			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.81	0.53			0.90	0.52	0.45		0.99			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 77 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 25.3 Intersection LOS: C
Intersection Capacity Utilization 65.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						452			3			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	469	2136	0	0	2072	784	794	0	810	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	510	2322	0	0	2252	852	863	0	880	0	0	0
Lane Group Flow (vph)	510	2322	0	0	2252	852	863	0	880	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	15.0	66.0	0.0	0.0	51.0	51.0	44.0	0.0	44.0	0.0	0.0	0.0
Total Split (%)	13.6%	60.0%	0.0%	0.0%	46.4%	46.4%	40.0%	0.0%	40.0%	0.0%	0.0%	0.0%
Maximum Green (s)	10.4	61.4			46.4	46.4	39.4		39.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	11.0	62.0			47.0	47.0	40.0		40.0			
Actuated g/C Ratio	0.10	0.56			0.43	0.43	0.36		0.36			
v/c Ratio	1.49	1.16			1.49	0.91	0.70		1.54			
Control Delay	257.8	93.6			251.2	28.9	33.5		279.3			
Queue Delay	0.0	60.7			0.0	0.0	1.5		0.0			
Total Delay	257.8	154.3			251.2	28.9	35.0		279.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			F	C	D		F			
Approach Delay		172.9			190.2							
Approach LOS		F			F							
Queue Length 50th (ft)	~257	~1020			~1159	303	265		~882			
Queue Length 95th (ft)	m#228	m#889			#1296	#609	336		#1126			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	343	1995			1512	935	1236		572			
Starvation Cap Reductn	0	209			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	200		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.49	1.30			1.49	0.91	0.83		1.54			

Intersection Summary

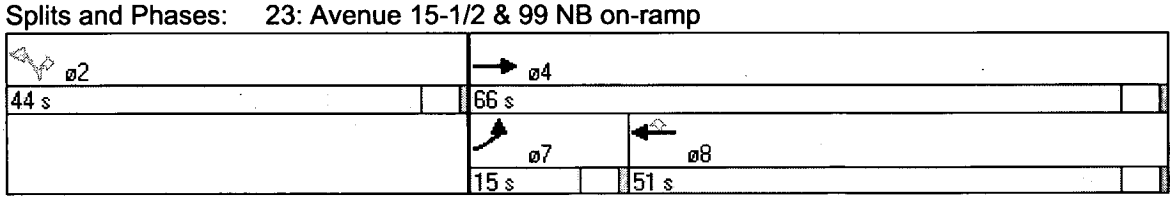
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.54
Intersection Signal Delay: 176.6 Intersection LOS: F
Intersection Capacity Utilization 182.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



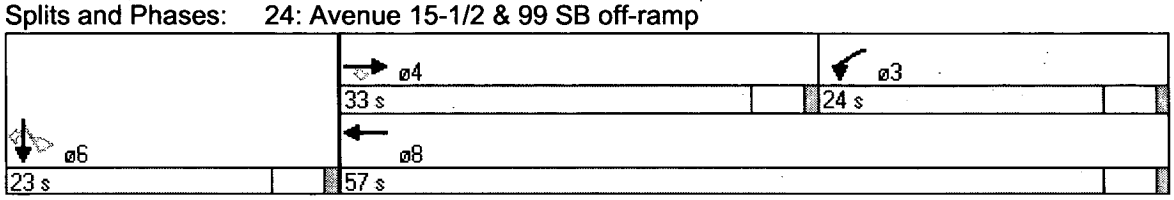
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			475									89
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	878	437	535	1150	0	0	0	0	360	1	233
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	954	475	582	1250	0	0	0	0	391	1	253
Lane Group Flow (vph)	0	954	475	582	1250	0	0	0	0	196	196	253
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	33.0	33.0	24.0	57.0	0.0	0.0	0.0	0.0	23.0	23.0	23.0
Total Split (%)	0.0%	41.3%	41.3%	30.0%	71.3%	0.0%	0.0%	0.0%	0.0%	28.8%	28.8%	28.8%
Maximum Green (s)		28.4	28.4	19.4	52.4					18.4	18.4	18.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		33.1	33.1	20.0	57.1					14.9	14.9	14.9
Actuated g/C Ratio		0.41	0.41	0.25	0.71					0.19	0.19	0.19
v/c Ratio		0.65	0.51	0.69	0.50					0.63	0.63	0.69
Control Delay		22.2	4.1	20.6	1.8					38.5	38.4	29.1
Queue Delay		0.0	0.0	0.0	0.3					0.0	0.0	0.0
Total Delay		22.2	4.1	20.6	2.1					38.5	38.4	29.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A					D	D	C
Approach Delay		16.2			8.0						34.8	
Approach LOS		B			A						C	
Queue Length 50th (ft)		198	0	131	18					94	94	75
Queue Length 95th (ft)		286	59	m167	m42					155	155	145
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1465	934	842	2478					399	400	444
Starvation Cap Reductn		0	0	0	553					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.65	0.51	0.69	0.65					0.49	0.49	0.57

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 15.4 Intersection LOS: B
Intersection Capacity Utilization 65.1% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.952	
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1681	1685	1583
Flt Permitted				0.950						0.950	0.952	
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1681	1685	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			644									6
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1824	828	487	2379	0	0	0	0	781	1	387
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1983	900	529	2586	0	0	0	0	849	1	421
Lane Group Flow (vph)	0	1983	900	529	2586	0	0	0	0	425	425	421
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	61.0	61.0	19.0	80.0	0.0	0.0	0.0	0.0	30.0	30.0	30.0
Total Split (%)	0.0%	55.5%	55.5%	17.3%	72.7%	0.0%	0.0%	0.0%	0.0%	27.3%	27.3%	27.3%
Maximum Green (s)		56.4	56.4	14.4	75.4					25.4	25.4	25.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		57.0	57.0	15.0	76.0					26.0	26.0	26.0
Actuated g/C Ratio		0.52	0.52	0.14	0.69					0.24	0.24	0.24
v/c Ratio		1.08	0.80	1.13	1.06					1.07	1.07	1.11
Control Delay		73.8	11.8	97.3	37.5					106.2	105.3	119.0
Queue Delay		5.3	0.0	0.0	92.7					119.4	118.5	0.0
Total Delay		79.1	11.8	97.3	130.2					225.6	223.8	119.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	B	F	F					F	F	F
Approach Delay		58.1			124.6						189.7	
Approach LOS		E			F						F	
Queue Length 50th (ft)		~826	132	~224	~1055					~350	~350	~339
Queue Length 95th (ft)		#965	337	m163	m127					#555	#554	#537
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1834	1131	468	2445					397	398	379
Starvation Cap Reductn		0	0	0	407					0	0	0
Spillback Cap Reductn		21	0	0	0					83	83	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		1.09	0.80	1.13	1.27					1.35	1.35	1.11

Intersection Summary

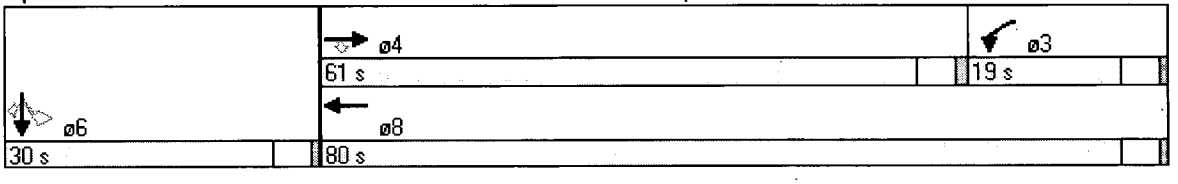
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 108 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 109.6 Intersection LOS: F
Intersection Capacity Utilization 182.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



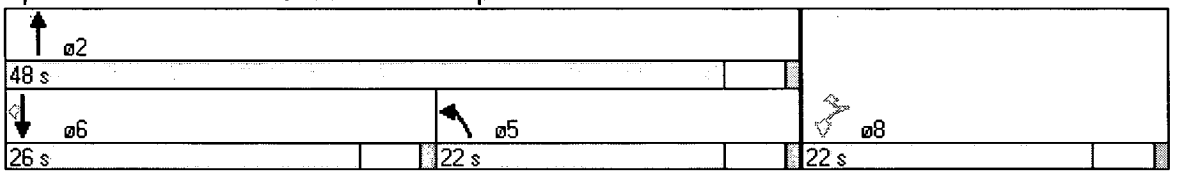
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						53						556
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	678	0	49	685	759	0	0	268	656
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	737	0	53	745	825	0	0	291	713
Lane Group Flow (vph)	0	0	0	737	0	53	745	825	0	0	291	713
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	22.0	0.0	22.0	22.0	48.0	0.0	0.0	26.0	26.0
Total Split (%)	0.0%	0.0%	0.0%	31.4%	0.0%	31.4%	31.4%	68.6%	0.0%	0.0%	37.1%	37.1%
Maximum Green (s)				17.4		17.4	17.4	43.4			21.4	21.4
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				18.0		18.0	18.6	44.0			21.4	21.4
Actuated g/C Ratio				0.26		0.26	0.27	0.63			0.31	0.31
v/c Ratio				0.83		0.12	0.82	0.70			0.51	0.82
Control Delay				34.8		7.3	23.8	6.4			24.0	14.9
Queue Delay				0.0		0.0	0.0	0.3			0.0	0.0
Total Delay				34.8		7.3	23.8	6.7			24.0	14.9
LOS				C		A	C	A			C	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								14.8			17.5	
Approach LOS								B			B	
Queue Length 50th (ft)				154		0	143	124			108	55
Queue Length 95th (ft)				#241		24	m147	m127			170	#261
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				905		456	929	1183			607	891
Starvation Cap Reductn				0		0	0	67			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.81		0.12	0.80	0.74			0.48	0.80

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 16 (23%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 19.9 Intersection LOS: B
Intersection Capacity Utilization 66.8% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
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
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						470
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	697	0	67	1108	1062	0	0	449	765
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	758	0	73	1204	1154	0	0	488	832
Lane Group Flow (vph)	0	0	0	758	0	73	1204	1154	0	0	488	832
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	26.0	49.4	0.0	0.0	23.4	23.4
Total Split (%)	0.0%	0.0%	0.0%	29.4%	0.0%	29.4%	37.1%	70.6%	0.0%	0.0%	33.4%	33.4%
Maximum Green (s)				16.0		16.0	21.4	44.8			18.8	18.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				16.6		16.6	22.0	45.4			19.4	19.4
Actuated g/C Ratio				0.24		0.24	0.31	0.65			0.28	0.28
v/c Ratio				0.93		0.17	1.12	0.96			0.95	1.07
Control Delay				46.7		7.2	72.5	9.7			55.9	66.7
Queue Delay				0.0		0.0	0.0	35.8			0.0	0.0
Total Delay				46.7		7.2	72.5	45.6			55.9	66.7
LOS				D		A	E	D			E	E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								59.3			62.7	
Approach LOS								E			E	
Queue Length 50th (ft)				164		0	~306	114			205	~243
Queue Length 95th (ft)				#268		29	m116	m71			#382	#453
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				814		431	1079	1208			516	778
Starvation Cap Reductn				0		0	0	142			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.93		0.17	1.12	1.08			0.95	1.07

Intersection Summary

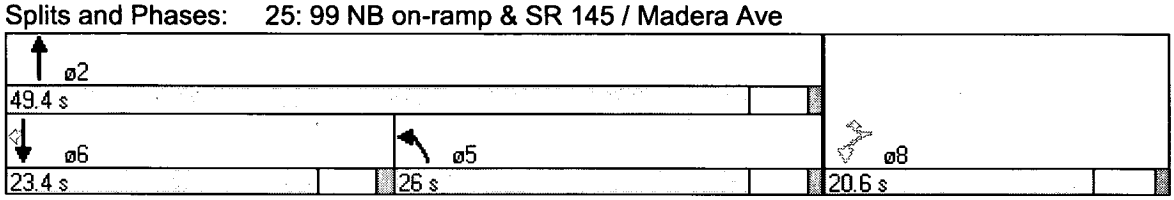
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 3 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 57.3 Intersection LOS: E
Intersection Capacity Utilization 85.6% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						97
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	792	719	0	804	369
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	861	782	0	874	401
Lane Group Flow (vph)	0	861	782	0	874	401
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	34.0	34.0	0.0	36.0	36.0
Total Split (%)	0.0%	48.6%	48.6%	0.0%	51.4%	51.4%
Maximum Green (s)		29.4	29.4		31.4	31.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		30.0	30.0		32.0	32.0
Actuated g/C Ratio		0.43	0.43		0.46	0.46
v/c Ratio		1.08	0.98		1.09	0.52
Control Delay		78.2	35.9		81.6	12.9
Queue Delay		87.8	63.4		3.4	0.0
Total Delay		166.0	99.3		84.9	12.9
LOS		F	F		F	B
Approach Delay		166.0	99.3		62.3	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	F		E	
Queue Length 50th (ft)		~424	225		~434	85
Queue Length 95th (ft)		#630	m#441		#643	160
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		798	798		801	769
Starvation Cap Reductn		0	123		0	0
Spillback Cap Reductn		127	0		6	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.28	1.16		1.10	0.52

Intersection Summary

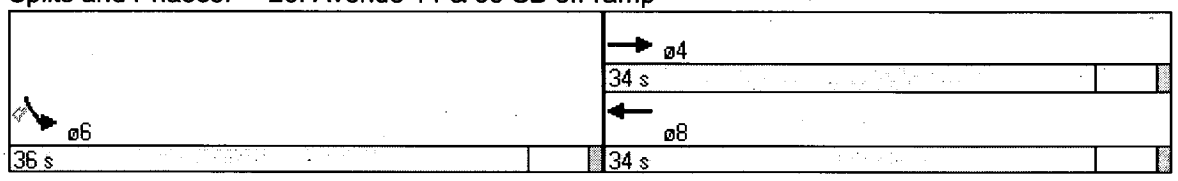
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 10 (14%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 102.8 Intersection LOS: F
Intersection Capacity Utilization 92.9% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						86
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	1117	778	0	1153	308
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1214	846	0	1253	335
Lane Group Flow (vph)	0	1214	846	0	1253	335
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	35.0	35.0	0.0	35.0	35.0
Total Split (%)	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%
Maximum Green (s)		30.4	30.4		30.4	30.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		31.0	31.0		31.0	31.0
Actuated g/C Ratio		0.44	0.44		0.44	0.44
v/c Ratio		1.47	1.03		1.60	0.45
Control Delay		240.8	35.2		296.9	12.1
Queue Delay		134.0	96.3		41.7	0.0
Total Delay		374.8	131.5		338.6	12.1
LOS		F	F		F	B
Approach Delay		374.8	131.5		269.7	
Approach LOS		F	F		F	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		~735	~421		~790	68
Queue Length 95th (ft)		#964	m#354		#1020	132
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		825	825		784	749
Starvation Cap Reductn		0	153		0	0
Spillback Cap Reductn		139	0		43	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.77	1.26		1.69	0.45

Intersection Summary

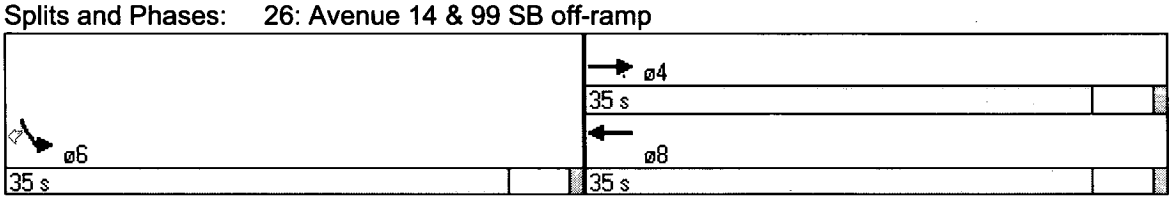
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 9 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.60
Intersection Signal Delay: 272.6 Intersection LOS: F
Intersection Capacity Utilization 129.3% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.996	
Satd. Flow (prot)	3335	1810	1538	0	0	0	1752	1845	1568	0	3491	1568
Flt Permitted	0.950						0.950				0.591	
Satd. Flow (perm)	3335	1810	1538	0	0	0	1752	1845	1568	0	2071	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			479						98			458
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	383	363	850	0	0	0	298	1061	90	40	485	421
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	416	395	924	0	0	0	324	1153	98	43	527	458
Lane Group Flow (vph)	416	395	924	0	0	0	324	1153	98	0	570	458
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	26.0	26.0	26.0	0.0	0.0	0.0	17.3	44.0	44.0	26.7	26.7	26.7
Total Split (%)	37.1%	37.1%	37.1%	0.0%	0.0%	0.0%	24.7%	62.9%	62.9%	38.1%	38.1%	38.1%
Maximum Green (s)	21.4	21.4	21.4				12.7	39.4	39.4	22.1	22.1	22.1
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	22.0	22.0	22.0				13.4	40.0	40.0		22.6	22.6
Actuated g/C Ratio	0.31	0.31	0.31				0.19	0.57	0.57		0.32	0.32
v/c Ratio	0.40	0.69	1.14				0.97	1.09	0.10		0.85	0.56
Control Delay	19.2	22.4	78.6				73.2	75.5	2.0		23.6	4.0
Queue Delay	29.8	264.6	120.5				8.1	0.0	0.0		0.0	3.6
Total Delay	49.0	287.1	199.1				81.3	75.5	2.0		23.6	7.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	F	F				F	E	A		C	A
Approach Delay		183.1						72.1			16.5	
Approach LOS		F						E			B	
Queue Length 50th (ft)	75	144	~316				140	~574	0		41	12
Queue Length 95th (ft)	m68	m132	m#247				#289	#800	17		m#60	m16
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1048	569	812				335	1054	938		672	818
Starvation Cap Reductn	641	319	157				0	0	0		0	0
Spillback Cap Reductn	0	0	0				12	0	0		0	265
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.02	1.58	1.41				1.00	1.09	0.10		0.85	0.83

Intersection Summary

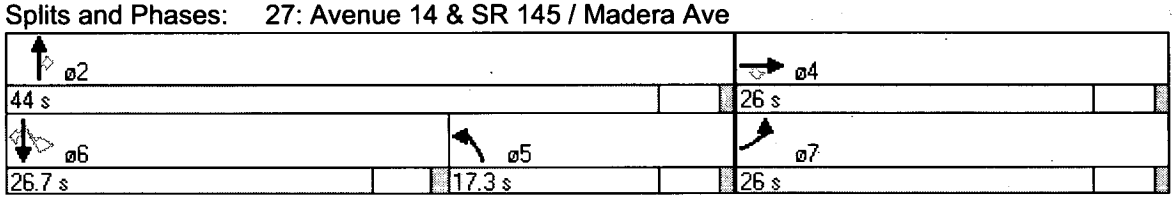
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 103.3 Intersection LOS: F
Intersection Capacity Utilization 99.5% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.994	
Satd. Flow (prot)	3367	1827	1553	0	0	0	1770	1863	1583	0	3518	1583
Flt Permitted	0.950						0.950				0.606	
Satd. Flow (perm)	3367	1827	1553	0	0	0	1770	1863	1583	0	2145	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			380						64			475
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	470	547	1253	0	0	0	341	1700	96	82	627	437
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	511	595	1362	0	0	0	371	1848	104	89	682	475
Lane Group Flow (vph)	511	595	1362	0	0	0	371	1848	104	0	771	475
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	31.0	31.0	31.0	0.0	0.0	0.0	14.0	39.0	39.0	25.0	25.0	25.0
Total Split (%)	44.3%	44.3%	44.3%	0.0%	0.0%	0.0%	20.0%	55.7%	55.7%	35.7%	35.7%	35.7%
Maximum Green (s)	26.4	26.4	26.4				9.4	34.4	34.4	20.4	20.4	20.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	27.0	27.0	27.0				10.0	35.0	35.0		21.0	21.0
Actuated g/C Ratio	0.39	0.39	0.39				0.14	0.50	0.50		0.30	0.30
v/c Ratio	0.39	0.84	1.64				1.47	1.98	0.13		1.20	0.59
Control Delay	15.0	21.4	305.3				257.8	465.6	4.9		120.6	12.9
Queue Delay	104.0	482.6	219.4				138.2	0.0	0.0		0.0	0.9
Total Delay	119.0	504.0	524.7				396.0	465.6	4.9		120.6	13.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F	F				F	F	A		F	B
Approach Delay		435.7						433.9			79.9	
Approach LOS		F						F			E	
Queue Length 50th (ft)	77	212	~858				~224	~1268	8		~230	107
Queue Length 95th (ft)	m49	m115	m#320				#378	#1518	30		m#256	m126
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1299	705	832				253	932	824		644	807
Starvation Cap Reductn	879	418	191				0	0	0		0	0
Spillback Cap Reductn	0	0	0				44	0	0		0	126
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.22	2.07	2.12				1.78	1.98	0.13		1.20	0.70

Intersection Summary

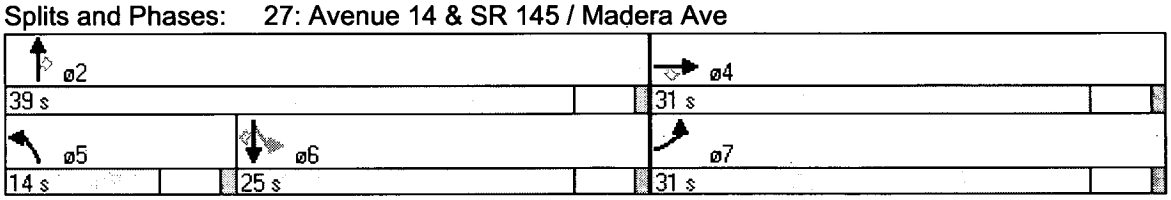
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 20 (29%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.98
Intersection Signal Delay: 361.6 Intersection LOS: F
Intersection Capacity Utilization 148.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	412			316	225
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	71	468	0	0	359	255
Percent Heavy Vehicles	37	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						250
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	284
Percent Heavy Vehicles	0	0	0	0	0	25
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	71							284
C (m) (veh/h)	817							537
v/c	0.09							0.53
95% queue length	0.28							3.07
Control Delay (s/veh)	9.8							19.0
LOS	A							C
Approach Delay (s/veh)	--	--				19.0		
Approach LOS	--	--				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 6:34 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2 | North/South Street: Pistachio

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	588			461	263
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	668	0	0	523	298
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						280
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	318
Percent Heavy Vehicles	0	0	0	0	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	82							318
C (m) (veh/h)	685							445
v/c	0.12							0.71
95% queue length	0.41							5.56
Control Delay (s/veh)	11.0							30.9
LOS	B							D
Approach Delay (s/veh)	–	–				30.9		
Approach LOS	–	–				D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 7:23 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Godlen State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	40	51	454	51	115
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	45	57	515	57	130
Percent Heavy Vehicles	8	–	–	46	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	29	78	237	111	45	4
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	32	88	269	126	51	4
Percent Heavy Vehicles	20	20	20	79	79	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	515		389			181	
C (m) (veh/h)	1352	1256		163			0	
v/c	0.00	0.41		2.39				
95% queue length	0.01	2.04		32.71				
Control Delay (s/veh)	7.7	9.8		687.0				
LOS	A	A		F			F	
Approach Delay (s/veh)	–	–	687.0					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Golden State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	12	90	76	582	100	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	13	102	86	661	113	144
Percent Heavy Vehicles	5	–	–	49	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	41	89	390	127	62	5
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	46	101	443	144	70	5
Percent Heavy Vehicles	20	20	20	48	48	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	13	661		590			219	
C (m) (veh/h)	1290	1148		0			0	
v/c	0.01	0.58						
95% queue length	0.03	3.83						
Control Delay (s/veh)	7.8	12.3						
LOS	A	B		F			F	
Approach Delay (s/veh)	–	–						
Approach LOS	–	–						

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 7:24 PM

ATTACHMENT VI – C - 31

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐ URBAN (U)

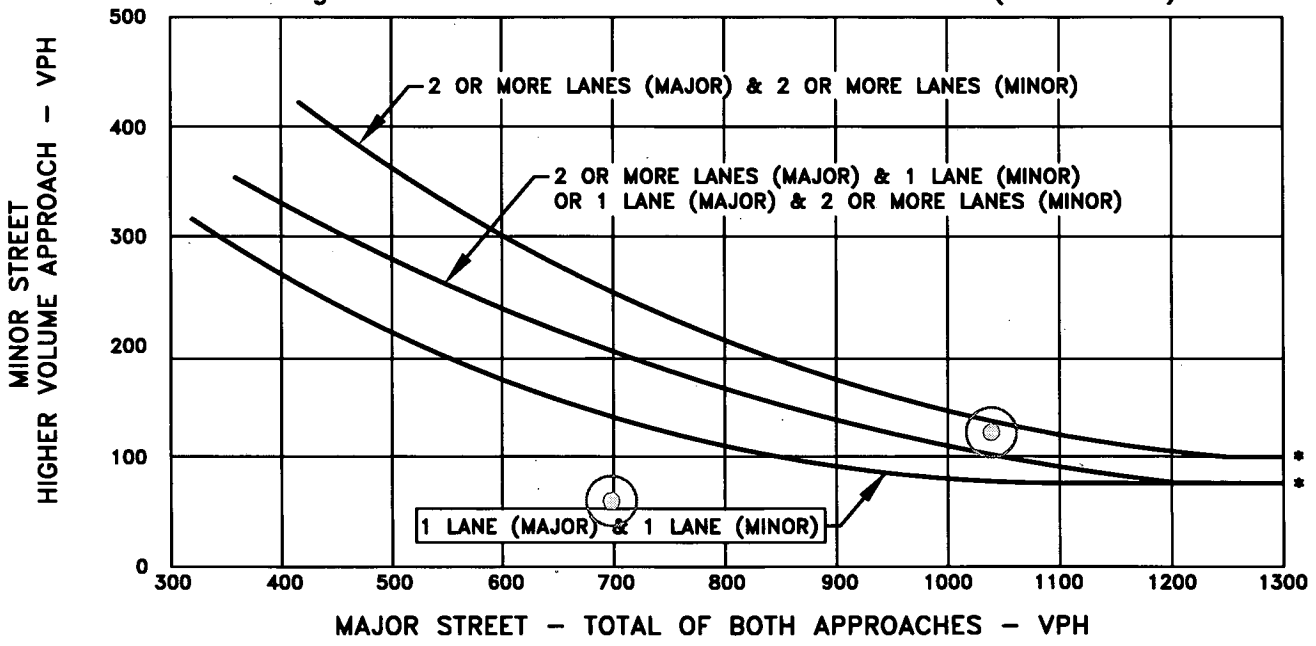
CONDITION: 2030 PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		698	1039				
Highest Approaches – Minor Street	✓		60	122				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting incorporated

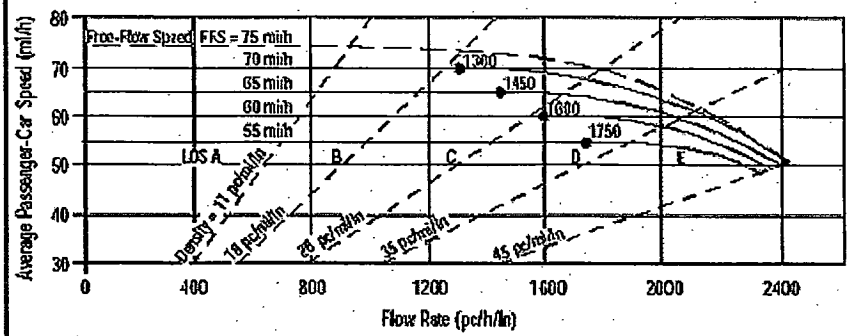
ATTACHMENT VI – C - 32

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4272*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1740*	pc/h/ln
S	*68.5*	mi/h
D = v_p / S	*25.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

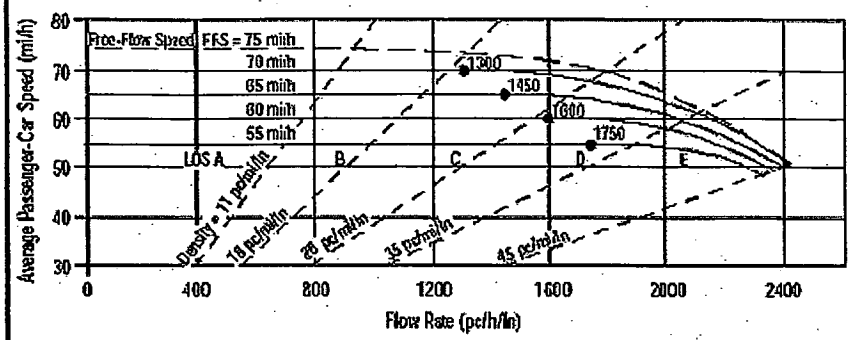
N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4421*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

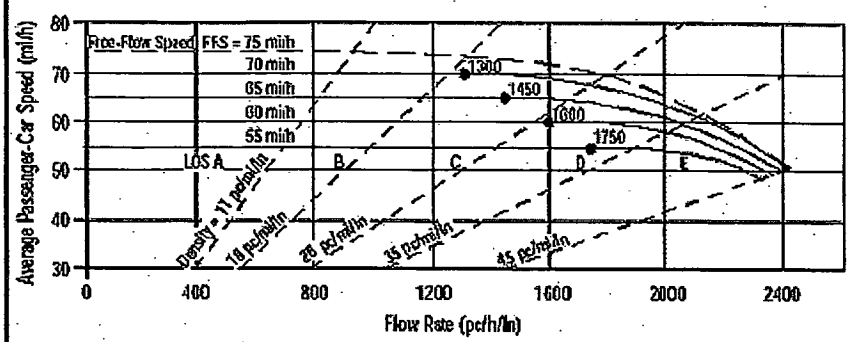
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1800*	pc/h/ln	Design LOS	
S	*67.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*26.5*	pc/mi/ln	S	mi/h
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/16/06*
Analysis Time Period	*2030 Project AM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*North of Avenue 18 1/2*
Jurisdiction	*Caltrans*
Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3521*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1434*	pc/h/ln
S	*69.9*	mi/h
D = v_p / S	*20.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

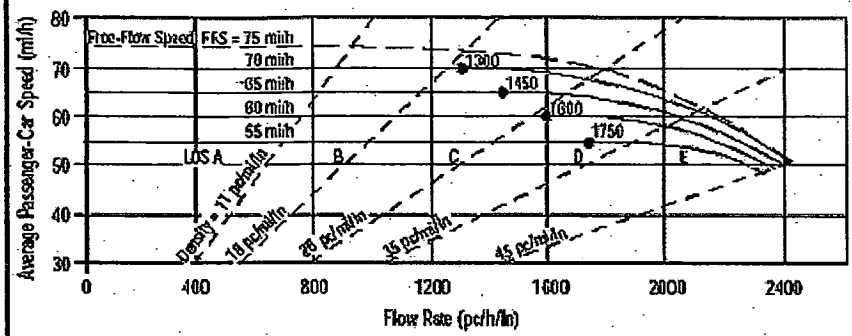
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5354*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2180*	pc/h/ln	Design LOS		
S	*60.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*35.9*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary

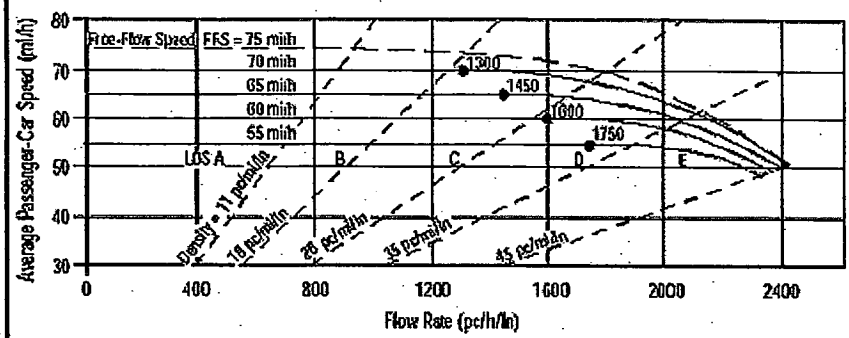
N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4635*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

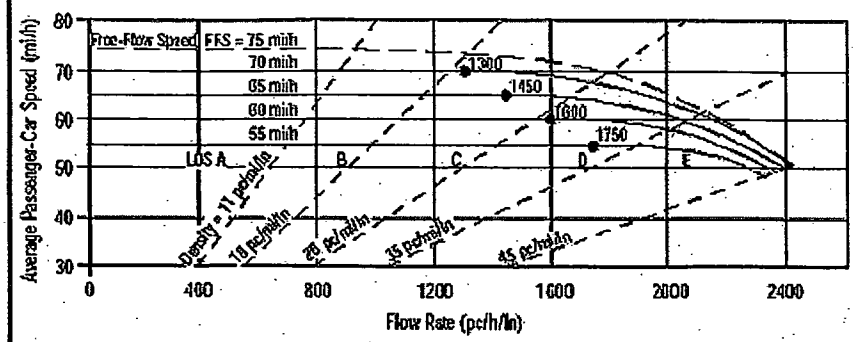
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1888*	pc/h/ln	Design LOS		
S	*66.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*28.3*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4699*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1914*	pc/h/ln
S	*66.3*	mi/h
D = v_p / S	*28.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

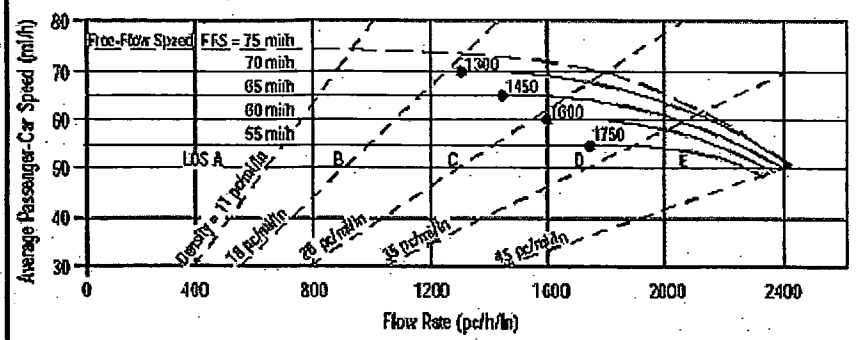
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3793*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

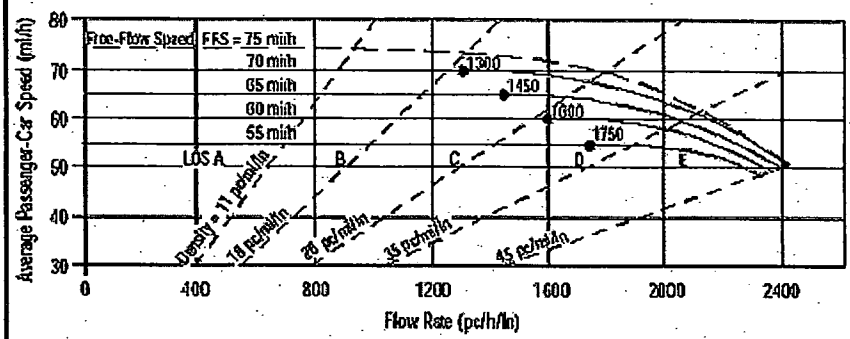
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1545*	pc/h/ln	Design LOS		
S	*69.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*22.2*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*5733*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

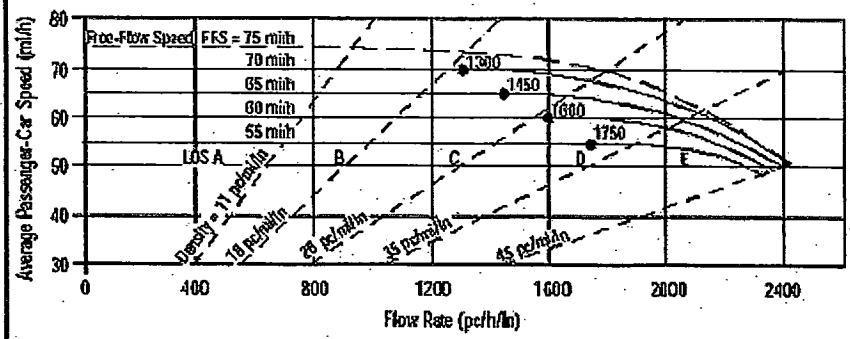
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*3*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2335*	pc/h/ln	Design LOS		
S	*55.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*41.9*	pc/mi/ln	S		mi/h
LOS	*E*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2030 Project AM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5310*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2162*	pc/h/ln
S	*61.2*	mi/h
D = v_p / S	*35.4*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

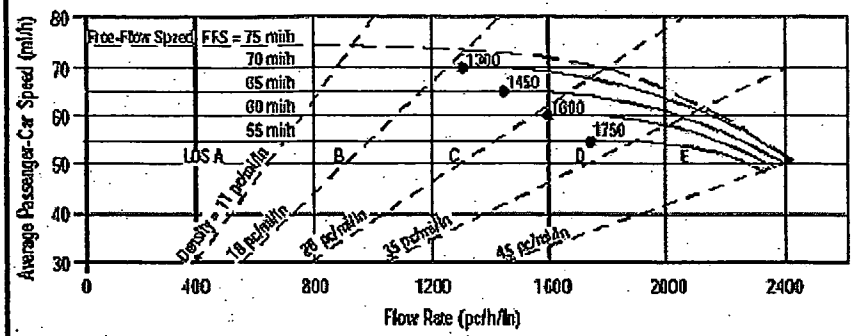
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*2030 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*south of Avenue 17*
Jurisdiction	*Caltrans*
Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6412*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*3*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) *2611*		pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

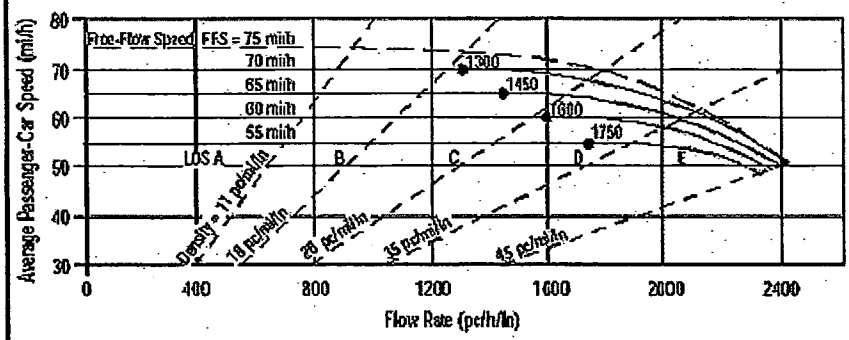
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☑ Planning Data

Flow Inputs

Volume, V	*4124*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1260*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*18.0*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

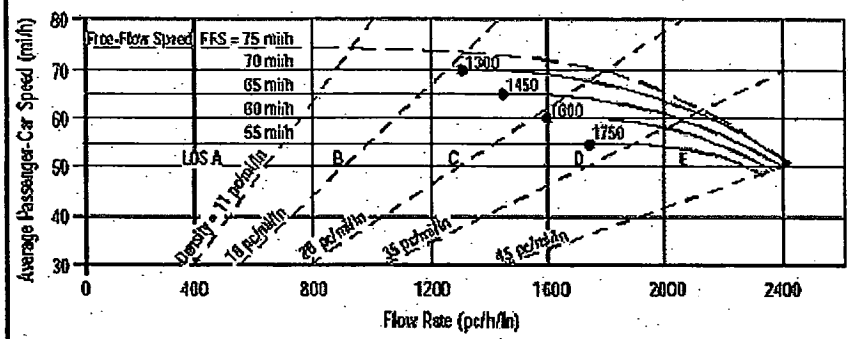
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7134*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2179*	pc/h/ln	Design LOS	
S	*60.7*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*35.9*	pc/mi/ln	S	mi/h
LOS	*E*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 33

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

INTERSECTION LEVEL OF SERVICE CALCULATIONS

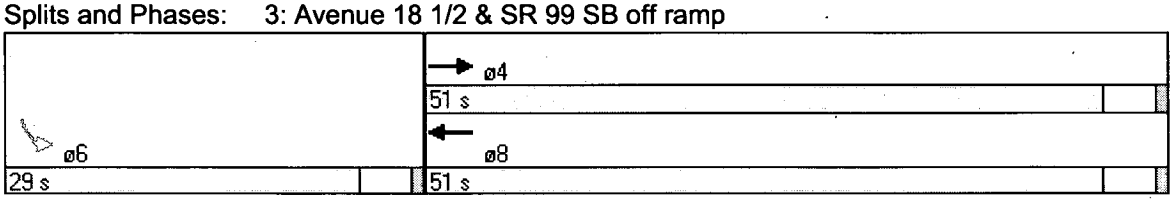
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.881	
Flt Protected					0.994	
Satd. Flow (prot)	0	1473	1557	0	1214	0
Flt Permitted					0.994	
Satd. Flow (perm)	0	1473	1557	0	1214	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					299	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	513	298	0	34	263
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	583	339	0	39	299
Lane Group Flow (vph)	0	583	339	0	338	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	51.0	51.0	0.0	29.0	0.0
Total Split (%)	0.0%	63.8%	63.8%	0.0%	36.3%	0.0%
Maximum Green (s)		46.4	46.4		24.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		47.0	47.0		25.0	
Actuated g/C Ratio		0.59	0.59		0.31	
v/c Ratio		0.67	0.37		0.58	
Control Delay		16.2	1.2		8.7	
Queue Delay		0.0	0.0		0.0	
Total Delay		16.2	1.2		8.7	
LOS		B	A		A	
Approach Delay		16.2	1.2		8.7	
Approach LOS		B	A		A	
90th %ile Green (s)		46.4	46.4		24.4	
90th %ile Term Code		Coord	Coord		MaxR	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		46.4	46.4		24.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		46.4	46.4		24.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		46.4	46.4		24.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		46.4	46.4		24.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		181	3		14	
Queue Length 95th (ft)		285	m2		79	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		865	915		585	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.67	0.37		0.58	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 69 (86%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 10.1 Intersection LOS: B
Intersection Capacity Utilization 51.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	
Trailing Detector (ft)		0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.882	
Flt Protected					0.994	
Satd. Flow (prot)	0	1473	1557	0	1216	0
Flt Permitted					0.994	
Satd. Flow (perm)	0	1473	1557	0	1216	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					426	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	702	351	0	65	439
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	798	399	0	74	499
Lane Group Flow (vph)	0	798	399	0	573	0
Turn Type						
Protected Phases		4	8			
Permitted Phases					6	
Detector Phases		4	8		6	
Minimum Initial (s)		4.0	4.0		4.0	
Minimum Split (s)		20.9	20.9		20.9	
Total Split (s)	0.0	53.0	53.0	0.0	27.0	0.0
Total Split (%)	0.0%	66.3%	66.3%	0.0%	33.8%	0.0%
Maximum Green (s)		48.4	48.4		22.4	
Yellow Time (s)		3.6	3.6		3.6	
All-Red Time (s)		1.0	1.0		1.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	
Recall Mode		C-Max	C-Max		Max	
Act Effct Green (s)		49.0	49.0		23.0	
Actuated g/C Ratio		0.61	0.61		0.29	
v/c Ratio		0.88	0.42		0.88	
Control Delay		27.4	1.9		24.4	
Queue Delay		0.0	0.0		0.0	
Total Delay		27.4	1.9		24.4	
LOS		C	A		C	
Approach Delay		27.4	1.9		24.4	
Approach LOS		C	A		C	
90th %ile Green (s)		48.4	48.4		22.4	
90th %ile Term Code		Coord	Coord		MaxR	

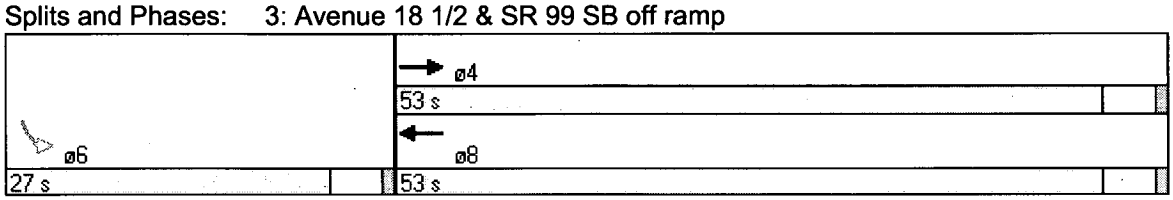
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		48.4	48.4		22.4	
70th %ile Term Code		Coord	Coord		MaxR	
50th %ile Green (s)		48.4	48.4		22.4	
50th %ile Term Code		Coord	Coord		MaxR	
30th %ile Green (s)		48.4	48.4		22.4	
30th %ile Term Code		Coord	Coord		MaxR	
10th %ile Green (s)		48.4	48.4		22.4	
10th %ile Term Code		Coord	Coord		MaxR	
Queue Length 50th (ft)		302	5		65	
Queue Length 95th (ft)		#556	m19		#267	
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		902	954		653	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.88	0.42		0.88	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 16 (20%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 20.7 Intersection LOS: C
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.977				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1480	1557	0	0	1614	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1480	1557	0	0	1614	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					12				34			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	392	124	0	0	172	35	281	0	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	445	141	0	0	195	40	319	0	89	0	0	0
Lane Group Flow (vph)	445	141	0	0	235	0	0	319	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	33.0	55.0	0.0	0.0	22.0	0.0	25.0	25.0	25.0	0.0	0.0	0.0
Total Split (%)	41.3%	68.8%	0.0%	0.0%	27.5%	0.0%	31.3%	31.3%	31.3%	0.0%	0.0%	0.0%
Maximum Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	29.0	52.3			19.3			19.7	19.7			
Actuated g/C Ratio	0.36	0.65			0.24			0.25	0.25			
v/c Ratio	0.83	0.14			0.59			0.86	0.25			
Control Delay	20.3	0.9			33.2			52.1	17.6			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	20.3	0.9			33.2			52.1	17.6			

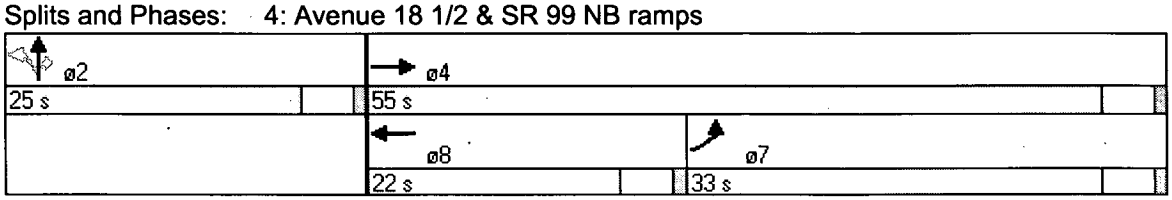
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		15.6			33.2			44.6				
Approach LOS		B			C			D				
90th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	28.4	51.2			18.2		19.6	19.6	19.6			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	28.4	56.0			23.0		14.8	14.8	14.8			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	182	3			101			149	21			
Queue Length 95th (ft)	m191	m4			171			#271	56			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	537	1018			398			395	378			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.83	0.14			0.59			0.81	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 32 (40%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 28.6 Intersection LOS: C
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	1		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.960				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1220	1284	0	0	1673	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	1220	1284	0	0	1673	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					24				19			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	265	86	0	0	116	48	243	0	36	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	301	98	0	0	132	55	276	0	41	0	0	0
Lane Group Flow (vph)	301	98	0	0	187	0	0	276	41	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	31.0	53.0	0.0	0.0	22.0	0.0	27.0	27.0	27.0	0.0	0.0	0.0
Total Split (%)	38.8%	66.3%	0.0%	0.0%	27.5%	0.0%	33.8%	33.8%	33.8%	0.0%	0.0%	0.0%
Maximum Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	27.0	51.8			20.8			20.2	20.2			
Actuated g/C Ratio	0.34	0.65			0.26			0.25	0.25			
v/c Ratio	0.73	0.12			0.41			0.82	0.13			
Control Delay	22.3	2.5			25.8			48.0	14.9			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	22.3	2.5			25.8			48.0	14.9			

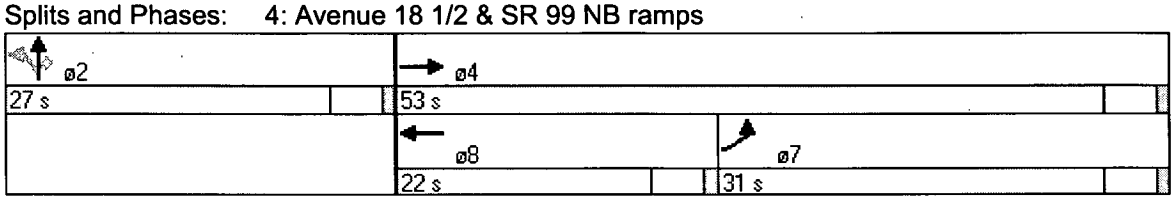
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C			D	B			
Approach Delay		17.4			25.8			43.7				
Approach LOS		B			C			D				
90th %ile Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	26.4	49.1			18.1		21.7	21.7	21.7			
50th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
30th %ile Green (s)	26.4	52.6			21.6		18.2	18.2	18.2			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	26.4	57.6			26.6		13.2	13.2	13.2			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	131	5			69			125	8			
Queue Length 95th (ft)	#240	m8			128			#224	30			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	412	832			453			384	357			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.73	0.12			0.41			0.72	0.11			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 28.4 Intersection LOS: C
Intersection Capacity Utilization 51.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



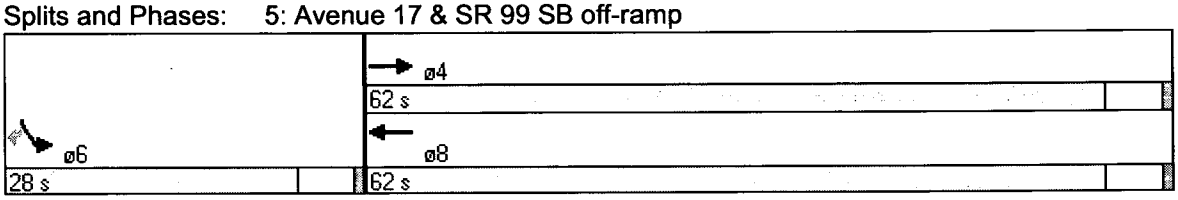
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3374	3505	0	1703	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	3374	3505	0	1703	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1516	1454	0	155	244
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	1723	1652	0	176	277
Lane Group Flow (vph)	0	1723	1652	0	176	277
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	62.0	62.0	0.0	28.0	28.0
Total Split (%)	0.0%	68.9%	68.9%	0.0%	31.1%	31.1%
Maximum Green (s)		56.7	56.7		22.7	22.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		62.3	62.3		19.7	19.7
Actuated g/C Ratio		0.69	0.69		0.22	0.22
v/c Ratio		0.74	0.68		0.47	0.77
Control Delay		3.5	3.8		34.0	43.0
Queue Delay		0.3	0.0		0.0	0.0
Total Delay		3.8	3.8		34.0	43.0
LOS		A	A		C	D
Approach Delay		3.8	3.8		39.5	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		D	
Queue Length 50th (ft)		43	49		87	130
Queue Length 95th (ft)		73	m212		137	202
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2336	2427		454	431
Starvation Cap Reductn		174	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.80	0.68		0.39	0.64

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 64 (71%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 8.0 Intersection LOS: A
Intersection Capacity Utilization 73.8% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3343	0	1671	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3343	0	1671	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						6
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	2987	2360	0	334	347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	3394	2682	0	380	394
Lane Group Flow (vph)	0	3394	2682	0	380	394
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	90.0	90.0	0.0	30.0	30.0
Total Split (%)	0.0%	75.0%	75.0%	0.0%	25.0%	25.0%
Maximum Green (s)		84.7	84.7		24.7	24.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		86.0	86.0		26.0	26.0
Actuated g/C Ratio		0.72	0.72		0.22	0.22
v/c Ratio		1.36	1.12		1.05	1.20
Control Delay		182.9	67.2		106.6	155.2
Queue Delay		26.5	75.4		0.0	0.0
Total Delay		209.4	142.6		106.6	155.2
LOS		F	F		F	F
Approach Delay		209.4	142.6		131.3	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	F		F	
Queue Length 50th (ft)		~1788	~1253		~321	~368
Queue Length 95th (ft)		m347	m266		#496	#548
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		2488	2396		362	329
Starvation Cap Reductn		103	28		0	0
Spillback Cap Reductn		0	315		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.42	1.29		1.05	1.20

Intersection Summary

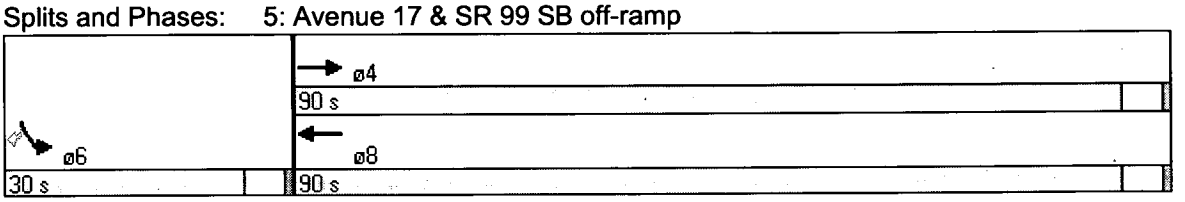
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 78 (65%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.36
Intersection Signal Delay: 174.4 Intersection LOS: F
Intersection Capacity Utilization 112.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



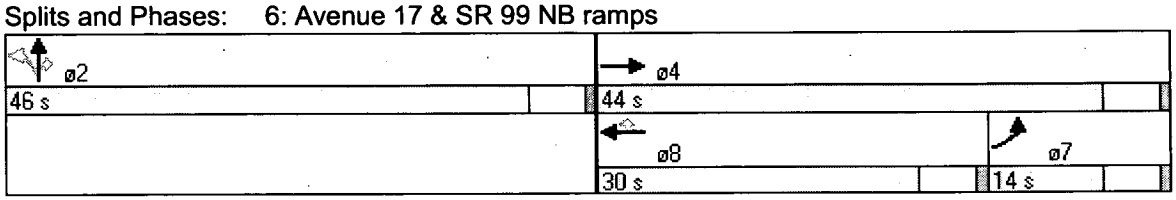
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.956				
Satd. Flow (prot)	1752	3505	0	0	3539	1583	1681	1692	2787	0	0	0
Flt Permitted	0.950						0.950	0.956				
Satd. Flow (perm)	1752	3505	0	0	3539	1583	1681	1692	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						81			434			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	146	415	0	0	780	71	1190	47	382	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	166	472	0	0	886	81	1352	53	434	0	0	0
Lane Group Flow (vph)	166	472	0	0	886	81	684	721	434	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	14.0	44.0	0.0	0.0	30.0	30.0	46.0	46.0	46.0	0.0	0.0	0.0
Total Split (%)	15.6%	48.9%	0.0%	0.0%	33.3%	33.3%	51.1%	51.1%	51.1%	0.0%	0.0%	0.0%
Maximum Green (s)	8.7	38.7			24.7	24.7	40.7	40.7	40.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	10.0	40.8			26.8	26.8	41.2	41.2	41.2			
Actuated g/C Ratio	0.11	0.45			0.30	0.30	0.46	0.46	0.46			
v/c Ratio	0.85	0.30			0.84	0.15	0.89	0.93	0.29			
Control Delay	59.4	10.9			38.7	6.6	38.0	43.6	2.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	59.4	10.9			38.7	6.6	38.0	43.6	2.0			
LOS	E	B			D	A	D	D	A			
Approach Delay		23.5			36.0			31.7				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			D			C				
Queue Length 50th (ft)	85	51			250	0	354	386	0			
Queue Length 95th (ft)	m#154	72			#340	31	#564	#610	24			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	195	1589			1054	528	784	790	1532			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.85	0.30			0.84	0.15	0.87	0.91	0.28			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 84 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 31.4 Intersection LOS: C
Intersection Capacity Utilization 73.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	1770	3539	0	0	3539	1583	1681	1686	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						163			80			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	220	1024	0	0	1399	236	1843	5	1379	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	250	1164	0	0	1590	268	2094	6	1567	0	0	0
Lane Group Flow (vph)	250	1164	0	0	1590	268	1047	1053	1567	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	17.0	63.0	0.0	0.0	46.0	46.0	57.0	57.0	57.0	0.0	0.0	0.0
Total Split (%)	14.2%	52.5%	0.0%	0.0%	38.3%	38.3%	47.5%	47.5%	47.5%	0.0%	0.0%	0.0%
Maximum Green (s)	11.7	57.7			40.7	40.7	51.7	51.7	51.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	13.0	59.0			42.0	42.0	53.0	53.0	53.0			
Actuated g/C Ratio	0.11	0.49			0.35	0.35	0.44	0.44	0.44			
v/c Ratio	1.30	0.67			1.28	0.41	1.41	1.41	1.23			
Control Delay	176.8	15.7			167.8	13.3	222.2	223.2	139.6			
Queue Delay	0.0	0.0			35.4	0.0	0.0	0.0	0.0			
Total Delay	176.8	15.7			203.2	13.3	222.2	223.2	139.6			
LOS	F	B			F	B	F	F	F			
Approach Delay		44.2			175.8			187.2				
Approach LOS		D			F			F				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	~248	278			~823	56	~1146	~1154	~834			
Queue Length 95th (ft)	m145	m180			#929	123	#1368	#1376	#951			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	192	1740			1239	660	742	745	1276			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			72	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	1.30	0.67			1.36	0.41	1.41	1.41	1.23			

Intersection Summary

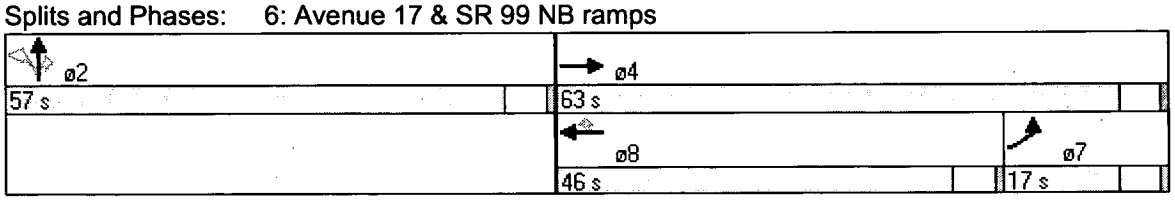
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.41
Intersection Signal Delay: 155.0 Intersection LOS: F
Intersection Capacity Utilization 112.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



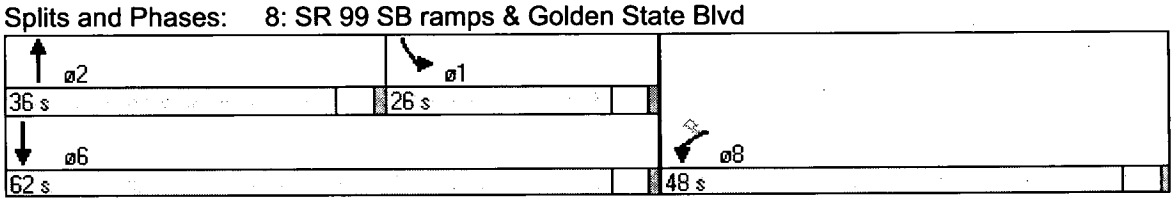
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.889			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1626	1455	1656	0	1770	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1626	1455	1656	0	1770	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		334	211			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	537	299	89	407	276	87
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	610	340	101	462	314	99
Lane Group Flow (vph)	610	340	563	0	314	99
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	48.0	48.0	36.0	0.0	26.0	62.0
Total Split (%)	43.6%	43.6%	32.7%	0.0%	23.6%	56.4%
Maximum Green (s)	43.4	43.4	31.4		21.4	57.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	43.1	43.1	33.0		21.9	58.9
Actuated g/C Ratio	0.39	0.39	0.30		0.20	0.54
v/c Ratio	0.96	0.44	0.87		0.89	0.10
Control Delay	59.8	4.5	28.0		71.0	13.3
Queue Delay	0.0	0.0	10.7		0.0	0.0
Total Delay	59.8	4.5	38.7		71.0	13.3
LOS	E	A	D		E	B
Approach Delay	40.0		38.7			57.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	D		D			E
Queue Length 50th (ft)	407	3	152		217	34
Queue Length 95th (ft)	#612	54	m161		#362	60
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	652	783	652		361	999
Starvation Cap Reductn	0	0	75		0	0
Spillback Cap Reductn	0	0	0		0	100
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.94	0.43	0.98		0.87	0.11

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 43.3 Intersection LOS: D
Intersection Capacity Utilization 84.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	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
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.892			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1538	1662	0	1641	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1538	1662	0	1641	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		479	166			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	959	778	143	560	350	131
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	1090	884	162	636	398	149
Lane Group Flow (vph)	1090	884	798	0	398	149
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.6	20.6	20.6		8.6	20.6
Total Split (s)	57.0	57.0	39.0	0.0	24.0	63.0
Total Split (%)	47.5%	47.5%	32.5%	0.0%	20.0%	52.5%
Maximum Green (s)	52.4	52.4	34.4		19.4	58.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	53.0	53.0	35.0		20.0	59.0
Actuated g/C Ratio	0.44	0.44	0.29		0.17	0.49
v/c Ratio	1.44	0.93	1.33		1.45	0.18
Control Delay	232.7	32.1	167.1		259.5	17.7
Queue Delay	82.3	0.0	282.8		0.0	0.2
Total Delay	315.0	32.1	449.9		259.5	17.9
LOS	F	C	F		F	B
Approach Delay	188.3		449.9			193.7

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	F		F			F
Queue Length 50th (ft)	~1145	356	~704		~421	62
Queue Length 95th (ft)	#1356	#650	m45		#600	100
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	759	947	602		274	849
Starvation Cap Reductn	0	0	194		0	0
Spillback Cap Reductn	86	0	0		0	283
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.62	0.93	1.96		1.45	0.26

Intersection Summary

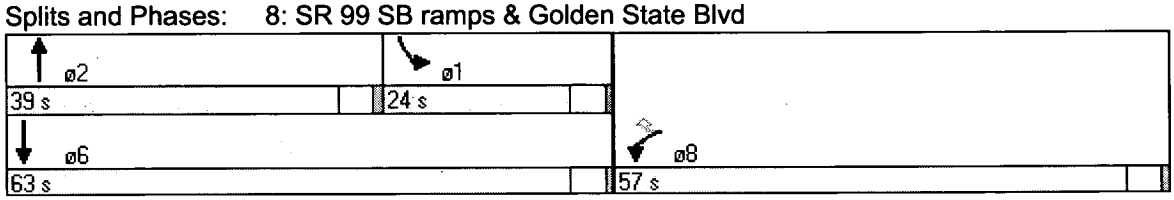
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 114 (95%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.45
Intersection Signal Delay: 252.1 Intersection LOS: F
Intersection Capacity Utilization 124.5% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.947			0.853				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1641	1727	1468	1703	1697	0	1612	1447	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26		28			399				84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	242	296	24	113	446	246	70	8	406	529	18	77
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	263	322	26	123	485	267	76	9	441	575	20	84
Lane Group Flow (vph)	263	322	26	123	752	0	76	450	0	575	20	84
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	17.0	39.7	39.7	19.7	42.4	0.0	15.2	20.6	0.0	30.0	35.4	35.4
Total Split (%)	15.5%	36.1%	36.1%	17.9%	38.5%	0.0%	13.8%	18.7%	0.0%	27.3%	32.2%	32.2%
Maximum Green (s)	12.4	35.1	35.1	15.1	37.8		10.6	16.0		25.4	30.8	30.8
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	17.6	40.3	40.3	15.7	38.4		9.9	12.0		26.0	30.3	30.3
Actuated g/C Ratio	0.16	0.37	0.37	0.14	0.35		0.09	0.11		0.24	0.28	0.28
v/c Ratio	1.00	0.51	0.05	0.51	1.23		0.52	0.88		1.42	0.04	0.17
Control Delay	104.8	31.8	9.6	49.4	146.8		60.7	26.4		223.1	11.9	2.5
Queue Delay	0.0	0.1	0.0	0.0	48.5		0.0	2.0		43.3	0.0	0.0
Total Delay	104.8	31.9	9.6	49.4	195.4		60.7	28.4		266.4	11.9	2.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	C	A	D	F		E	C		F	B	A
Approach Delay		62.3			174.9			33.1			226.3	
Approach LOS		E			F			C			F	
Queue Length 50th (ft)	~200	176	0	86	~400		51	34		~531	6	8
Queue Length 95th (ft)	#408	282	20	m137	#879		100	#193		m#597	m7	m10
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	262	632	554	243	611		164	557		406	536	514
Starvation Cap Reductn	0	0	0	0	0		0	0		26	0	0
Spillback Cap Reductn	0	15	0	0	50		0	35		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.00	0.52	0.05	0.51	1.34		0.46	0.86		1.51	0.04	0.16

Intersection Summary

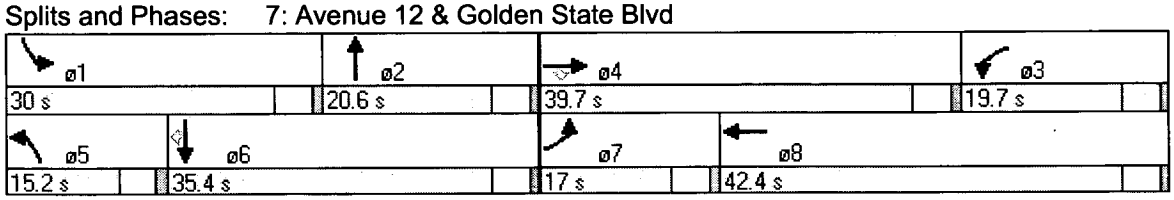
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 28 (25%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.42
Intersection Signal Delay: 134.6 Intersection LOS: F
Intersection Capacity Utilization 120.1% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	1		1	1		0	1		0	1		1
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
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.957			0.857				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1703	1715	0	1687	1522	0	1687	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15		18			279				71
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	420	409	14	138	652	260	149	23	466	1013	12	65
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	457	445	15	150	709	283	162	25	507	1101	13	71
Lane Group Flow (vph)	457	445	15	150	992	0	162	532	0	1101	13	71
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Detector Phases	7	4	4	3	8		5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6		8.6	20.6		8.6	20.6	20.6
Total Split (s)	19.0	43.6	43.6	18.4	43.0	0.0	24.1	21.0	0.0	37.0	33.9	33.9
Total Split (%)	15.8%	36.3%	36.3%	15.3%	35.8%	0.0%	20.1%	17.5%	0.0%	30.8%	28.3%	28.3%
Maximum Green (s)	14.4	39.0	39.0	13.8	38.4		19.5	16.4		32.4	29.3	29.3
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	Min
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	15.0	40.3	40.3	13.7	39.0		42.6	17.0		33.0	7.4	7.4
Actuated g/C Ratio	0.12	0.34	0.34	0.11	0.32		0.36	0.14		0.28	0.06	0.06
v/c Ratio	2.17	0.75	0.03	0.77	1.74		0.27	1.17		2.37	0.12	0.45
Control Delay	566.1	44.7	12.0	76.5	360.8		29.6	119.6		639.0	73.5	35.5
Queue Delay	145.6	0.8	0.0	0.0	28.5		0.0	143.3		55.2	0.0	0.0
Total Delay	711.8	45.5	12.0	76.5	389.3		29.6	263.0		694.2	73.5	35.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D	B	E	F		C	F		F	E	D
Approach Delay		377.0			348.2			208.5			648.0	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~567	307	0	117	~1127		88	~293		~1389	11	24
Queue Length 95th (ft)	#773	436	16	m141	m#824		150	#513		m#947	m11	m17
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	211	596	516	204	570		599	455		464	443	429
Starvation Cap Reductn	0	0	0	0	0		0	0		18	0	0
Spillback Cap Reductn	95	30	0	0	20		0	99		256	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	3.94	0.79	0.03	0.74	1.80		0.27	1.49		5.29	0.03	0.17

Intersection Summary

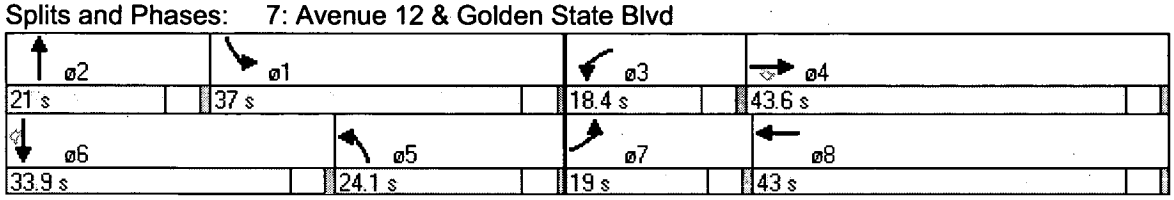
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 5 (4%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.37
Intersection Signal Delay: 420.5 Intersection LOS: F
Intersection Capacity Utilization 172.9% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	1845	0	0	1827	1553	0	1618	1442	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						841			84			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	106	1125	0	0	559	1075	245	11	409	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	120	1278	0	0	635	1222	278	12	465	0	0	0
Lane Group Flow (vph)	120	1278	0	0	635	1222	0	290	465	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	12.2	77.0	0.0	0.0	64.8	64.8	33.0	33.0	33.0	0.0	0.0	0.0
Total Split (%)	11.1%	70.0%	0.0%	0.0%	58.9%	58.9%	30.0%	30.0%	30.0%	0.0%	0.0%	0.0%
Maximum Green (s)	7.6	72.4			60.2	60.2	28.4	28.4	28.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	8.2	73.0			60.8	60.8		29.0	29.0			
Actuated g/C Ratio	0.07	0.66			0.55	0.55		0.26	0.26			
v/c Ratio	0.92	1.04			0.63	0.99		0.68	1.05			
Control Delay	83.7	42.7			20.4	32.2		45.6	90.4			
Queue Delay	0.0	1.3			0.0	0.0		0.0	0.0			
Total Delay	83.7	44.0			20.4	32.2		45.6	90.4			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D			C	C		D	F			
Approach Delay		47.4			28.2			73.2				
Approach LOS		D			C			E				
Queue Length 50th (ft)	79	~998			292	374		184	~313			
Queue Length 95th (ft)	m#89	m705			397	#818		273	#497			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	131	1224			1010	1235		427	442			
Starvation Cap Reductn	0	4			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.92	1.05			0.63	0.99		0.68	1.05			

Intersection Summary

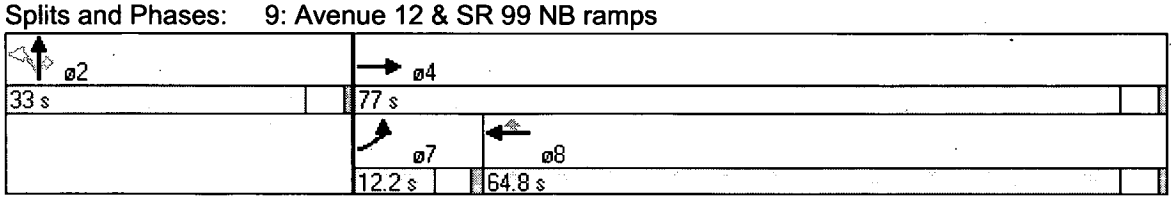
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 99 (90%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 43.3 Intersection LOS: D
Intersection Capacity Utilization 96.6% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	1810	0	0	1810	1538	0	1661	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						901			12			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	126	1760	0	0	759	1577	292	3	658	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	143	2000	0	0	862	1792	332	3	748	0	0	0
Lane Group Flow (vph)	143	2000	0	0	862	1792	0	335	748	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	13.0	77.0	0.0	0.0	64.0	64.0	43.0	43.0	43.0	0.0	0.0	0.0
Total Split (%)	10.8%	64.2%	0.0%	0.0%	53.3%	53.3%	35.8%	35.8%	35.8%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	72.4			59.4	59.4	38.4	38.4	38.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	73.0			60.0	60.0		39.0	39.0			
Actuated g/C Ratio	0.08	0.61			0.50	0.50		0.32	0.32			
v/c Ratio	1.11	1.82			0.95	1.47		0.62	1.53			
Control Delay	111.4	390.3			49.9	232.2		40.3	277.7			
Queue Delay	0.0	1.5			0.0	0.0		0.0	0.0			
Total Delay	111.4	391.8			49.9	232.2		40.3	277.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			D	F		D	F			
Approach Delay		373.1			173.0			204.2				
Approach LOS		F			F			F				
Queue Length 50th (ft)	~130	~2396			617	~1546		219	~811			
Queue Length 95th (ft)	m87	m#1326			#870	#1743		312	#1020			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	129	1101			905	1220		540	490			
Starvation Cap Reductn	0	2			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	1.11	1.82			0.95	1.47		0.62	1.53			

Intersection Summary

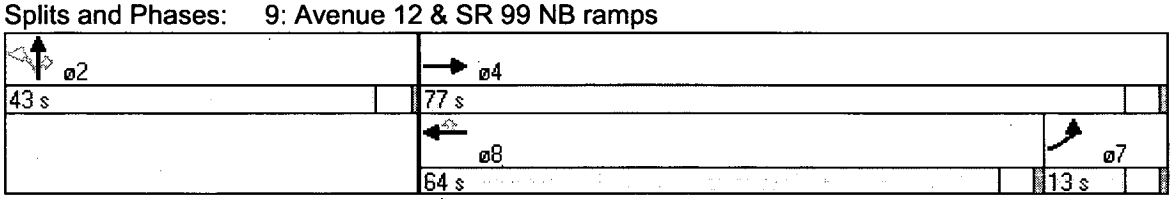
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 99 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.82
Intersection Signal Delay: 251.7 Intersection LOS: F
Intersection Capacity Utilization 140.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/24/2005	Analysis Year	2030
Analysis Time Period	2030 Project AM Alt B		

Project Description

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	18	300	2	57	289	13
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	16	8	14	2	20	32
Percent Heavy Vehicles	11	–	–	19	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	15	8	13	2	19	30
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	61	314	14	19	326	2
Percent Heavy Vehicles	2	0	0	17	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	19	61		54			38	
C (m) (veh/h)	1183	1142		446			341	
v/c	0.02	0.05		0.12			0.11	
95% queue length	0.05	0.17		0.41			0.37	
Control Delay (s/veh)	8.1	8.3		14.2			16.9	
LOS	A	A		B			C	
Approach Delay (s/veh)	–	–	14.2			16.9		
Approach LOS	–	–	B			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Ave 18 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	7/17/06	Analysis Year	2008
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alt B

East/West Street: Avenue 18	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	25	444	4	75	457	10
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	13	11	9	2	13	95
Percent Heavy Vehicles	13	–	–	15	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	12	11	9	2	12	88
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	81	496	10	27	482	4
Percent Heavy Vehicles	7	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	27	81		110			33	
C (m) (veh/h)	1005	1013		430			159	
v/c	0.03	0.08		0.26			0.21	
95% queue length	0.08	0.26		1.01			0.75	
Control Delay (s/veh)	8.7	8.9		16.2			33.5	
LOS	A	A		C			D	
Approach Delay (s/veh)	–	–	16.2			33.5		
Approach LOS	–	–	C			D		

Copyright © 2005 University of Florida, All Rights Reserved

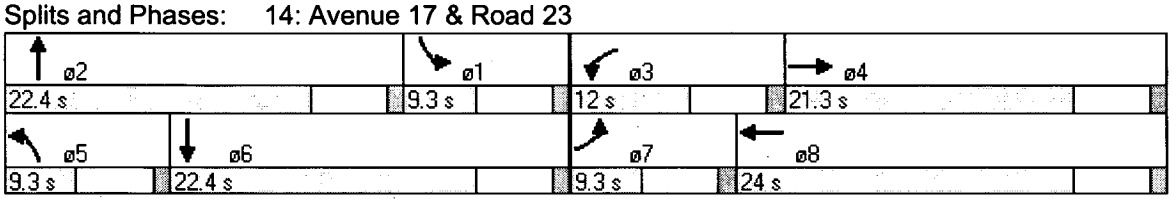
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.921			0.964			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1824	0	1770	1716	0	1770	1796	0	1770	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1824	0	1770	1716	0	1770	1796	0	1770	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			36			25			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	5	51	8	132	29	33	5	275	88	77	202	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	55	9	143	32	36	5	299	96	84	220	5
Lane Group Flow (vph)	5	64	0	143	68	0	5	395	0	84	225	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	12.0	24.0	0.0	9.3	22.4	0.0	9.3	22.4	0.0
Total Split (%)	14.3%	32.8%	0.0%	18.5%	36.9%	0.0%	14.3%	34.5%	0.0%	14.3%	34.5%	0.0%
Maximum Green (s)	4.0	16.0		6.7	18.7		4.0	17.1		4.0	17.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.8	9.4		9.1	16.0		5.8	31.5		5.8	35.6	
Actuated g/C Ratio	0.08	0.14		0.14	0.25		0.08	0.51		0.09	0.57	
v/c Ratio	0.03	0.24		0.57	0.15		0.03	0.43		0.54	0.21	
Control Delay	26.4	20.2		31.7	9.9		26.4	14.9		38.3	10.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.4	20.2		31.7	9.9		26.4	14.9		38.3	10.4	
LOS	C	C		C	A		C	B		D	B	
Approach Delay		20.7			24.7			15.1			17.9	
Approach LOS		C			C			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	2	16		46	7		2	103		27	39	
Queue Length 95th (ft)	10	44		#111	35		10	#200		#77	111	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	146	458		250	578		146	921		156	1063	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.03	0.14		0.57	0.12		0.03	0.43		0.54	0.21	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 62.2
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 18.4 Intersection LOS: B
Intersection Capacity Utilization 48.1% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



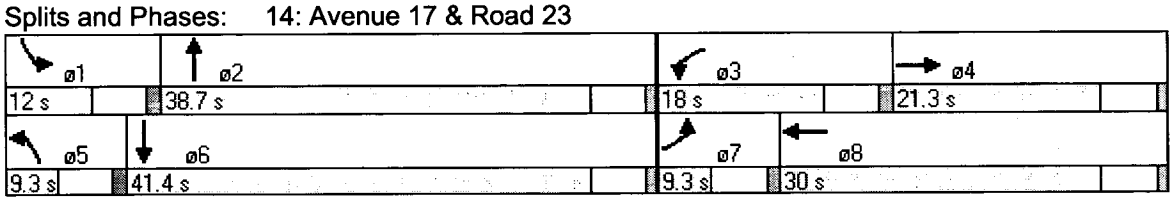
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.911			0.944			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1820	0	1770	1697	0	1770	1758	0	1770	1853	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1820	0	1770	1697	0	1770	1758	0	1770	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			82			39			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		61.5			42.4			36.1			35.9	
Volume (vph)	12	99	18	189	61	88	4	335	201	96	331	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	108	20	205	66	96	4	364	218	104	360	12
Lane Group Flow (vph)	13	128	0	205	162	0	4	582	0	104	372	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	18.0	30.0	0.0	9.3	38.7	0.0	12.0	41.4	0.0
Total Split (%)	10.3%	23.7%	0.0%	20.0%	33.3%	0.0%	10.3%	43.0%	0.0%	13.3%	46.0%	0.0%
Maximum Green (s)	4.0	16.0		12.7	24.7		4.0	33.4		6.7	36.1	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	11.9		13.1	24.5		5.3	38.3		7.9	45.7	
Actuated g/C Ratio	0.06	0.14		0.16	0.30		0.06	0.47		0.09	0.56	
v/c Ratio	0.12	0.48		0.72	0.29		0.04	0.69		0.63	0.36	
Control Delay	44.0	36.9		50.0	12.9		41.8	25.2		56.0	13.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	44.0	36.9		50.0	12.9		41.8	25.2		56.0	13.9	
LOS	D	D		D	B		D	C		E	B	
Approach Delay		37.6			33.6			25.3			23.1	
Approach LOS		D			C			C			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	7	59		104	28		2	246		54	103	
Queue Length 95th (ft)	26	111		#215	84		13	#460		#131	228	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	106	360		303	623		106	845		169	1038	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.36		0.68	0.26		0.04	0.69		0.62	0.36	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 81.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 27.7 Intersection LOS: C
Intersection Capacity Utilization 62.3% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Avenue 17 & Road 23



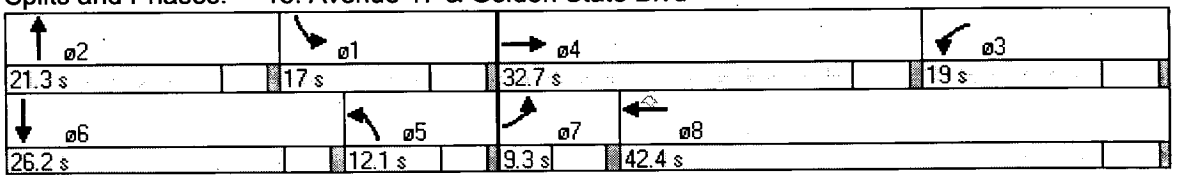
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.990				0.850		0.866			0.921	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1736	3471	1553	1492	1360	0	3433	1716	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3504	0	1736	3471	1553	1492	1360	0	3433	1716	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				473		285			22	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	37	841	62	231	998	435	49	31	262	391	18	20
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	40	914	67	251	1085	473	53	34	285	425	20	22
Lane Group Flow (vph)	40	981	0	251	1085	473	53	319	0	425	42	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	32.7	0.0	19.0	42.4	42.4	12.1	21.3	0.0	17.0	26.2	0.0
Total Split (%)	10.3%	36.3%	0.0%	21.1%	47.1%	47.1%	13.4%	23.7%	0.0%	18.9%	29.1%	0.0%
Maximum Green (s)	4.0	27.4		13.7	37.1	37.1	7.5	16.7		11.7	21.6	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	28.7		15.0	42.1	42.1	7.5	17.3		13.0	27.0	
Actuated g/C Ratio	0.06	0.32		0.17	0.47	0.47	0.08	0.19		0.14	0.30	
v/c Ratio	0.38	0.87		0.87	0.67	0.48	0.43	0.65		0.86	0.08	
Control Delay	51.8	38.9		54.5	16.1	3.5	49.9	13.0		55.8	16.4	
Queue Delay	0.0	0.0		0.0	0.2	0.1	0.0	0.0		0.0	0.0	
Total Delay	51.8	38.9		54.5	16.3	3.6	49.9	13.0		55.8	16.4	
LOS	D	D		D	B	A	D	B		E	B	
Approach Delay		39.4			18.3			18.2			52.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			B			B			D	
Queue Length 50th (ft)	22	272		133	240	49	29	16		123	9	
Queue Length 95th (ft)	55	#385		m#261	312	m62	66	101		#201	34	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	104	1124		289	1625	978	134	492		496	531	
Starvation Cap Reductn	0	0		0	84	77	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.38	0.87		0.87	0.70	0.52	0.40	0.65		0.86	0.08	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 28.5 Intersection LOS: C
Intersection Capacity Utilization 80.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.994				0.850		0.865			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3518	0	1656	3312	1482	1736	1580	0	3433	1703	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3518	0	1656	3312	1482	1736	1580	0	3433	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				626		251			52	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	60	1598	71	334	1507	806	110	53	476	905	37	50
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	65	1737	77	363	1638	876	120	58	517	984	40	54
Lane Group Flow (vph)	65	1814	0	363	1638	876	120	575	0	984	94	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Detector Phases	7	4		3	8	8	5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3		9.3	21.3	
Total Split (s)	9.3	48.0	0.0	21.0	59.7	59.7	19.9	28.0	0.0	23.0	31.1	0.0
Total Split (%)	7.8%	40.0%	0.0%	17.5%	49.8%	49.8%	16.6%	23.3%	0.0%	19.2%	25.9%	0.0%
Maximum Green (s)	4.0	42.7		15.7	54.4	54.4	15.3	23.4		17.7	26.5	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6		4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0			5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	5.3	44.0		17.0	55.7	55.7	13.3	24.0		19.0	29.7	
Actuated g/C Ratio	0.04	0.37		0.14	0.46	0.46	0.11	0.20		0.16	0.25	
v/c Ratio	0.83	1.40		1.54	1.07	0.86	0.62	1.11		1.81	0.20	
Control Delay	120.3	218.0		285.4	61.8	8.9	64.7	99.6		401.5	19.8	
Queue Delay	0.0	60.4		0.0	95.5	10.0	0.0	595.6		0.0	0.0	
Total Delay	120.3	278.4		285.4	157.3	18.9	64.7	695.3		401.5	19.8	
LOS	F	F		F	F	B	E	F		F	B	
Approach Delay		273.0			131.3			586.4			368.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	51	~996		~398	~733	118	90	~345		~591	25	
Queue Length 95th (ft)	#137	#1138		m#331	m510	m82	151	#569		#721	72	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	78	1292		235	1537	1023	230	517		544	460	
Starvation Cap Reductn	0	0		0	262	132	0	0		0	0	
Spillback Cap Reductn	0	113		0	0	0	0	282		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.83	1.54		1.54	1.28	0.98	0.52	2.45		1.81	0.20	

Intersection Summary

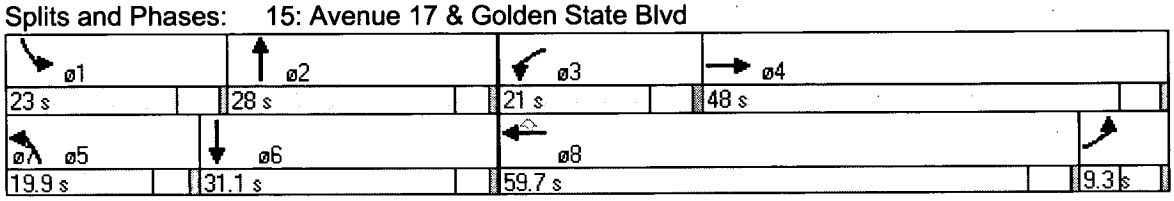
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 100 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.81
Intersection Signal Delay: 259.6 Intersection LOS: F
Intersection Capacity Utilization 136.3% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.874			0.872			0.994			0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1538	0	1671	1534	0	1770	3518	0	1770	3507	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1538	0	1671	1534	0	1770	3518	0	1770	3507	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		77			159			6			9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	73	14	71	59	26	146	172	1178	45	133	369	25
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
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	79	15	77	64	28	159	187	1280	49	145	401	27
Lane Group Flow (vph)	79	92	0	64	187	0	187	1329	0	145	428	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	9.0	20.9	0.0	20.0	38.1	0.0	12.0	30.1	0.0
Total Split (%)	11.3%	26.1%	0.0%	11.3%	26.1%	0.0%	25.0%	47.6%	0.0%	15.0%	37.6%	0.0%
Maximum Green (s)	4.1	16.0		4.1	16.0		15.1	33.2		7.1	25.2	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	8.9		5.0	8.9		12.6	34.6		8.2	34.2	
Actuated g/C Ratio	0.07	0.13		0.07	0.13		0.18	0.51		0.12	0.50	
v/c Ratio	0.65	0.35		0.53	0.56		0.59	0.74		0.68	0.24	
Control Delay	61.4	13.8		51.5	14.6		34.2	18.9		50.3	15.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	61.4	13.8		51.5	14.6		34.2	18.9		50.3	15.2	
LOS	E	B		D	B		C	B		D	B	
Approach Delay		35.8			24.0			20.8			24.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	34	6		28	11		75	238		62	63	
Queue Length 95th (ft)	#109	44		#87	65		143	#390		#164	116	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	121	394		121	457		386	1813		212	1768	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.65	0.23		0.53	0.41		0.48	0.73		0.68	0.24	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 68
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 69.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26

2030 Project PM Alternative C
17: Ellis & Road 26

9/13/2006

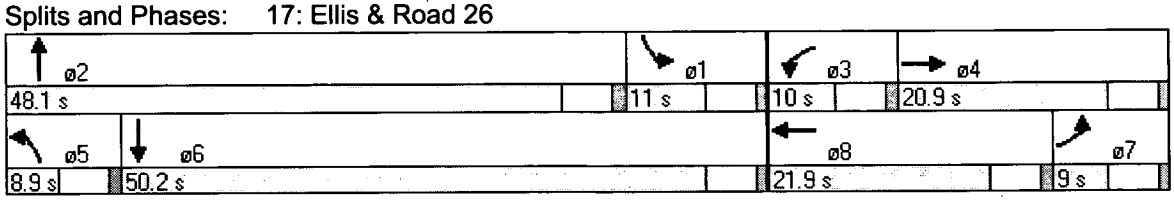
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.954			0.870			0.978			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1777	0	1770	1621	0	1770	3461	0	1770	3419	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1777	0	1770	1621	0	1770	3461	0	1770	3419	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			178			31			61	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		3120			2912			2904			2680	
Travel Time (s)		53.2			49.6			49.5			45.7	
Volume (vph)	65	119	52	74	42	268	35	1194	207	99	1023	297
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	129	57	80	46	291	38	1298	225	108	1112	323
Lane Group Flow (vph)	71	186	0	80	337	0	38	1523	0	108	1435	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	9.0	20.9	0.0	10.0	21.9	0.0	8.9	48.1	0.0	11.0	50.2	0.0
Total Split (%)	10.0%	23.2%	0.0%	11.1%	24.3%	0.0%	9.9%	53.4%	0.0%	12.2%	55.8%	0.0%
Maximum Green (s)	4.1	16.0		5.1	17.0		4.0	43.2		6.1	45.3	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	13.3		6.3	13.9		5.2	40.8		7.3	44.1	
Actuated g/C Ratio	0.07	0.17		0.08	0.18		0.06	0.52		0.09	0.57	
v/c Ratio	0.59	0.58		0.58	0.77		0.34	0.83		0.67	0.73	
Control Delay	63.3	37.0		58.4	29.7		49.5	23.1		62.1	17.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	63.3	37.0		58.4	29.7		49.5	23.1		62.1	17.0	
LOS	E	D		E	C		D	C		E	B	
Approach Delay		44.3			35.2			23.8			20.1	
Approach LOS		D			D			C			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	40	84		44	83		21	370		60	309	
Queue Length 95th (ft)	#112	151		#116	#191		53	#513		#150	419	
Internal Link Dist (ft)		3040			2832			2824			2600	
Turn Bay Length (ft)												
Base Capacity (vph)	120	405		139	509		112	1919		162	2039	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.59	0.46		0.58	0.66		0.34	0.79		0.67	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 78
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 24.9 Intersection LOS: C
Intersection Capacity Utilization 80.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Ellis & Road 26



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 Project AM Alt B		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	372	8	1	341	24
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	1	1	34	1	30
Percent Heavy Vehicles	8	–	–	10	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	32	1	28
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	370	26	1	404	8
Percent Heavy Vehicles	2	2	2	15	15	15
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	1	1		65			3	
C (m) (veh/h)	1131	1105		382			366	
v/c	0.00	0.00		0.17			0.01	
95% queue length	0.00	0.00		0.61			0.02	
Control Delay (s/veh)	8.2	8.3		16.3			14.9	
LOS	A	A		C			B	
Approach Delay (s/veh)	–	–	16.3			14.9		
Approach LOS	–	–	C			B		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/13/2006 3:40 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave15.5 @ Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/22/2005	Analysis Year	2030
Analysis Time Period	2030 Project PM Alt B		

Project Description

East/West Street: Avenue 15-1/2	North/South Street: Road 23
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	527	33	1	498	111
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	2	2	41	3	47
Percent Heavy Vehicles	17	–	–	9	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	2	2	38	3	44
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	1	541	120	2	572	35
Percent Heavy Vehicles	67	67	67	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	2	1		91			5	
C (m) (veh/h)	860	938		247			170	
v/c	0.00	0.00		0.37			0.03	
95% queue length	0.01	0.00		1.62			0.09	
Control Delay (s/veh)	9.2	8.8		27.8			26.8	
LOS	A	A		D			D	
Approach Delay (s/veh)	–	–	27.8			26.8		
Approach LOS	–	–	D			D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 9/13/2006 3:41 PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.972			0.944			0.987			0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1759	0	1626	1616	0	1504	1563	0	1570	1553	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1759	0	1626	1616	0	1504	1563	0	1570	1553	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			45			7			55	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	25	126	29	9	114	68	18	150	14	44	103	69
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	27	137	32	10	124	74	20	163	15	48	112	75
Lane Group Flow (vph)	27	169	0	10	198	0	20	178	0	48	187	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.7	0.0	10.7	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	36.5%	0.0%	16.5%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.4		5.4	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.4	13.5		5.5	11.9		5.5	28.3		6.8	30.3	
Actuated g/C Ratio	0.09	0.25		0.09	0.22		0.09	0.54		0.12	0.58	
v/c Ratio	0.17	0.37		0.07	0.51		0.14	0.21		0.26	0.20	
Control Delay	28.6	16.2		28.7	18.6		30.2	13.1		28.7	8.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.6	16.2		28.7	18.6		30.2	13.1		28.7	8.5	
LOS	C	B		C	B		C	B		C	A	
Approach Delay		17.9			19.1			14.8			12.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	5	27		2	27		4	16		9	12	
Queue Length 95th (ft)	32	96		17	103		27	102		47	85	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	161	582		149	517		138	852		183	926	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.29		0.07	0.38		0.14	0.21		0.26	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 52.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 39.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: Avenue 14 & Road 23

ø1	ø2	ø3	ø4
10.7 s	23.7 s	9.3 s	21.3 s
ø5	**ø6**	**ø7**	**ø8**
9.3 s	25.1 s	9.3 s	21.3 s

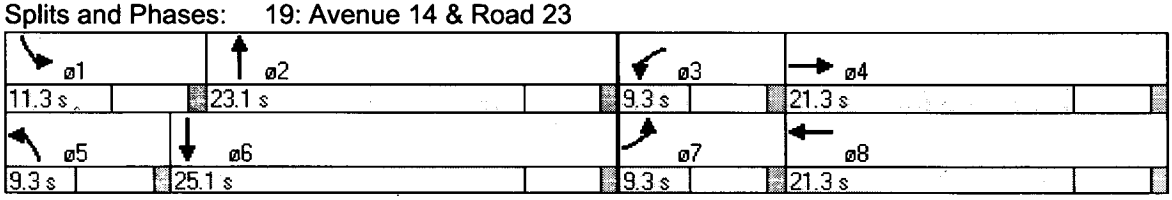
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949			0.932			0.991			0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1670	0	1736	1703	0	1703	1776	0	1556	1566	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1670	0	1736	1703	0	1703	1776	0	1556	1566	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			63			5			35	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	66	89	46	15	154	128	51	235	16	97	223	94
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	72	97	50	16	167	139	55	255	17	105	242	102
Lane Group Flow (vph)	72	147	0	16	306	0	55	272	0	105	344	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.1	0.0	11.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	35.5%	0.0%	17.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	17.8		6.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.3	17.0		5.3	13.6		5.3	23.1		7.3	26.8	
Actuated g/C Ratio	0.08	0.29		0.08	0.23		0.08	0.39		0.12	0.46	
v/c Ratio	0.51	0.29		0.11	0.69		0.38	0.39		0.56	0.47	
Control Delay	42.5	13.5		31.7	25.1		36.0	18.8		40.4	16.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	42.5	13.5		31.7	25.1		36.0	18.8		40.4	16.9	
LOS	D	B		C	C		D	B		D	B	
Approach Delay		23.1			25.4			21.7			22.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	27	26		6	83		21	84		39	98	
Queue Length 95th (ft)	#76	76		23	158		53	154		#101	186	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	142	583		140	521		145	701		188	734	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.51	0.25		0.11	0.59		0.38	0.39		0.56	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 58.7
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 23.0 Intersection LOS: C
Intersection Capacity Utilization 53.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Avenue 14 & Road 23



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.960			0.914			0.889			0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3398	0	3433	3235	0	1752	3116	0	2575	1302	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3398	0	3433	3235	0	1752	3116	0	2575	1302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61			412			462			51	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	165	377	136	395	307	409	108	150	425	269	106	88
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	36%	36%	36%
Adj. Flow (vph)	179	410	148	429	334	445	117	163	462	292	115	96
Lane Group Flow (vph)	179	558	0	429	779	0	117	625	0	292	211	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	17.0	24.1	0.0	18.0	25.1	0.0	13.0	20.9	0.0	17.0	24.9	0.0
Total Split (%)	21.3%	30.1%	0.0%	22.5%	31.4%	0.0%	16.3%	26.1%	0.0%	21.3%	31.1%	0.0%
Maximum Green (s)	12.1	19.2		13.1	20.2		8.1	16.0		12.1	20.0	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.0	24.9		14.7	26.7		8.6	11.8		12.5	17.9	
Actuated g/C Ratio	0.16	0.31		0.18	0.33		0.11	0.15		0.16	0.22	
v/c Ratio	0.62	0.51		0.68	0.58		0.62	0.73		0.72	0.64	
Control Delay	41.8	23.2		28.8	7.5		49.4	13.8		43.4	30.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	41.8	23.2		28.8	7.5		49.4	13.8		43.4	30.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C		C	A		D	B		D	C	
Approach Delay		27.7			15.0			19.4			38.1	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	84	111		88	88		57	38		71	75	
Queue Length 95th (ft)	#153	168		m117	m42		#120	84		#121	138	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	288	1101		650	1354		197	1023		418	379	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.62	0.51		0.66	0.58		0.59	0.61		0.70	0.56	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 69.7% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Ellis Ave & Golden State Blvd

ø1	ø2	ø3	ø4
17 s	20.9 s	18 s	24.1 s

ø5	ø6	ø8	ø7
13 s	24.9 s	25.1 s	17 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		0	1		0	2		0
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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	0.97	1.00	1.00
Frt		0.958			0.920			0.882			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	3433	3256	0	1597	2818	0	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	3433	3256	0	1597	2818	0	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			262			479			25	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	202	583	227	847	498	571	191	254	918	407	184	120
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	220	634	247	921	541	621	208	276	998	442	200	130
Lane Group Flow (vph)	220	881	0	921	1162	0	208	1274	0	442	330	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9		8.9	20.9		8.9	20.9	
Total Split (s)	19.9	33.0	0.0	32.0	45.1	0.0	24.2	37.0	0.0	18.0	30.8	0.0
Total Split (%)	16.6%	27.5%	0.0%	26.7%	37.6%	0.0%	20.2%	30.8%	0.0%	15.0%	25.7%	0.0%
Maximum Green (s)	15.0	28.1		27.1	40.2		19.3	32.1		13.1	25.9	
Yellow Time (s)	3.9	3.9		3.9	3.9		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	15.9	29.0		28.0	41.1		22.4	33.0		14.0	24.6	
Actuated g/C Ratio	0.13	0.24		0.23	0.34		0.19	0.28		0.12	0.20	
v/c Ratio	0.94	1.03		1.15	0.90		0.70	1.35dr		1.10	0.87	
Control Delay	96.3	81.7		104.2	21.7		60.2	98.0		124.3	65.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	96.3	81.7		104.2	21.7		60.2	98.0		124.3	65.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F		F	C		E	F		F	E	
Approach Delay		84.6			58.2			92.7			99.1	
Approach LOS		F			E			F			F	
Queue Length 50th (ft)	171	~370		~430	221		156	~454		~201	226	
Queue Length 95th (ft)	#325	#502		m#435	m238		#273	#594		#305	#371	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	235	854		801	1287		298	1122		401	411	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.94	1.03		1.15	0.90		0.70	1.14		1.10	0.80	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.15
Intersection Signal Delay: 78.7 Intersection LOS: E
Intersection Capacity Utilization 109.2% ICU Level of Service H
Analysis Period (min) 15

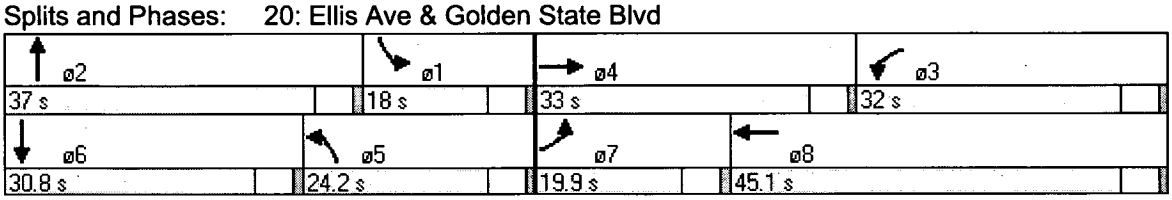
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



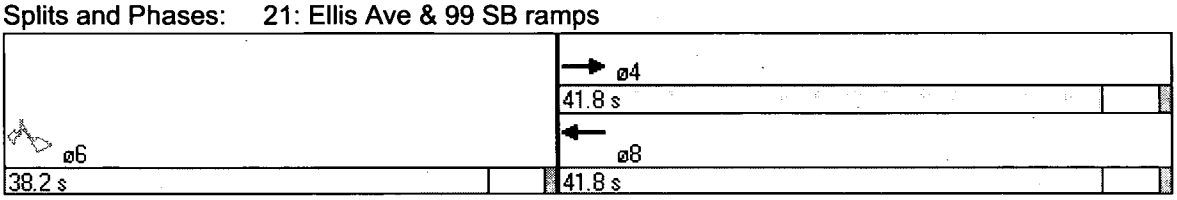
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑					↰		↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	3505	0	0	3167	0	0	0	0	1703	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												142
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1067	0	0	673	0	0	0	0	355	0	437
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
Heavy Vehicles (%)	3%	3%	3%	14%	14%	14%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	1160	0	0	732	0	0	0	0	386	0	475
Lane Group Flow (vph)	0	1160	0	0	732	0	0	0	0	386	0	475
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	41.8	0.0	0.0	41.8	0.0	0.0	0.0	0.0	38.2	0.0	38.2
Total Split (%)	0.0%	52.3%	0.0%	0.0%	52.3%	0.0%	0.0%	0.0%	0.0%	47.8%	0.0%	47.8%
Maximum Green (s)		36.9			36.9					33.3		33.3
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		46.9			46.9					25.1		25.1
Actuated g/C Ratio		0.59			0.59					0.31		0.31
v/c Ratio		0.56			0.39					0.72		0.82
Control Delay		6.7			6.6					31.5		29.3
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		6.7			6.6					31.5		29.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			A					C		C
Approach Delay		6.7			6.6							
Approach LOS		A			A							
Queue Length 50th (ft)		47			53					168		154
Queue Length 95th (ft)		210			m173					220		230
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2055			1857					728		733
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.56			0.39					0.53		0.65

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 77 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 14.1 Intersection LOS: B
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	1		1
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
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Flt Permitted										0.950		
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	1736	0	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												43
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1908	0	0	1108	0	0	0	0	575	0	808
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	2074	0	0	1204	0	0	0	0	625	0	878
Lane Group Flow (vph)	0	2074	0	0	1204	0	0	0	0	625	0	878
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	64.0	0.0	0.0	64.0	0.0	0.0	0.0	0.0	56.0	0.0	56.0
Total Split (%)	0.0%	53.3%	0.0%	0.0%	53.3%	0.0%	0.0%	0.0%	0.0%	46.7%	0.0%	46.7%
Maximum Green (s)		59.1			59.1					51.1		51.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		60.0			60.0					52.0		52.0
Actuated g/C Ratio		0.50			0.50					0.43		0.43
v/c Ratio		1.17			0.68					0.83		1.26
Control Delay		96.7			10.9					41.4		158.2
Queue Delay		0.0			0.8					0.0		0.0
Total Delay		96.7			11.7					41.4		158.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			B					D		F
Approach Delay		96.7			11.7							
Approach LOS		F			B							
Queue Length 50th (ft)		~1003			314					421		~838
Queue Length 95th (ft)		m#848			m191					#607		#1089
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		1770			1770					752		697
Starvation Cap Reductn		0			264					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		1.17			0.80					0.83		1.26

Intersection Summary

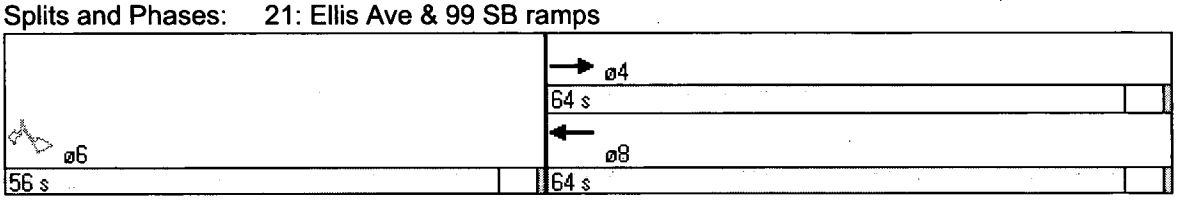
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 79.3 Intersection LOS: E
Intersection Capacity Utilization 127.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
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
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.939				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1736	3471	0	0	3110	0	3273	0	1509	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1736	3471	0	0	3110	0	3273	0	1509	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					210				322			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	535	522	0	0	544	370	402	0	296	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	9%	9%	9%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	582	567	0	0	591	402	437	0	322	0	0	0
Lane Group Flow (vph)	582	567	0	0	993	0	437	0	322	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	32.0	59.1	0.0	0.0	27.1	0.0	20.9	0.0	20.9	0.0	0.0	0.0
Total Split (%)	40.0%	73.9%	0.0%	0.0%	33.9%	0.0%	26.1%	0.0%	26.1%	0.0%	0.0%	0.0%
Maximum Green (s)	27.1	54.2			22.2		16.0		16.0			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	28.3	56.3			24.0		15.7		15.7			
Actuated g/C Ratio	0.35	0.70			0.30		0.20		0.20			
v/c Ratio	0.95	0.23			0.92		0.68		0.58			
Control Delay	45.5	3.6			36.8		35.5		8.1			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	45.5	3.6			36.8		35.5		8.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			D		D		A			
Approach Delay		24.9			36.8							
Approach LOS		C			D							
Queue Length 50th (ft)	254	23			207		103		0			
Queue Length 95th (ft)	#473	38			#338		150		65			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	614	2443			1080		691		573			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	0.95	0.23			0.92		0.63		0.56			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 28.7 Intersection LOS: C
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 22: Ellis Ave & 99 NB ramps

ø2	ø4		ø8
20.9 s	59.1 s		
	ø7		
	32 s		27.1 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	1		0	0		0	2		1	0		0
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
Leading Detector (ft)	50	50			50		50		50			
Trailing Detector (ft)	0	0			0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.944				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3309	0	3433	0	1583	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	3539	0	0	3309	0	3433	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					115				229			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	981	844	0	0	978	588	614	0	455	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1066	917	0	0	1063	639	667	0	495	0	0	0
Lane Group Flow (vph)	1066	917	0	0	1702	0	667	0	495	0	0	0
Turn Type	Prot						custom		custom			
Protected Phases	7	4			8							
Permitted Phases							2		2			
Detector Phases	7	4			8		2		2			
Minimum Initial (s)	4.0	4.0			4.0		4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9		20.9			
Total Split (s)	50.0	96.0	0.0	0.0	46.0	0.0	24.0	0.0	24.0	0.0	0.0	0.0
Total Split (%)	41.7%	80.0%	0.0%	0.0%	38.3%	0.0%	20.0%	0.0%	20.0%	0.0%	0.0%	0.0%
Maximum Green (s)	45.1	91.1			41.1		19.1		19.1			
Yellow Time (s)	3.9	3.9			3.9		3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0		1.0		1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		5.0			5.0		5.0		5.0			
Flash Dont Walk (s)		11.0			11.0		11.0		11.0			
Pedestrian Calls (#/hr)		0			0		0		0			
Act Effct Green (s)	46.0	92.0			42.0		20.0		20.0			
Actuated g/C Ratio	0.38	0.77			0.35		0.17		0.17			
v/c Ratio	1.57	0.34			1.38		1.17		1.09			
Control Delay	279.9	3.1			206.8		136.7		93.7			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	279.9	3.1			206.8		136.7		93.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	A			F		F		F			
Approach Delay		151.9			206.8							
Approach LOS		F			F							
Queue Length 50th (ft)	~1166	81			~894		~316		~274			
Queue Length 95th (ft)	m#1030	m86			#1037		#435		#488			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	679	2713			1233		572		455			
Starvation Cap Reductn	0	0			0		0		0			
Spillback Cap Reductn	0	0			0		0		0			
Storage Cap Reductn	0	0			0		0		0			
Reduced v/c Ratio	1.57	0.34			1.38		1.17		1.09			

Intersection Summary

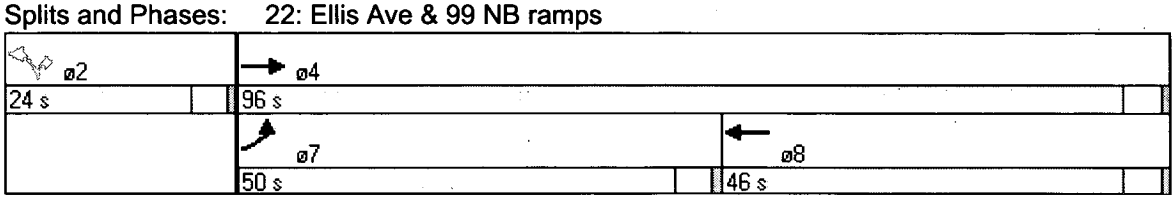
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.57
Intersection Signal Delay: 163.2 Intersection LOS: F
Intersection Capacity Utilization 127.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



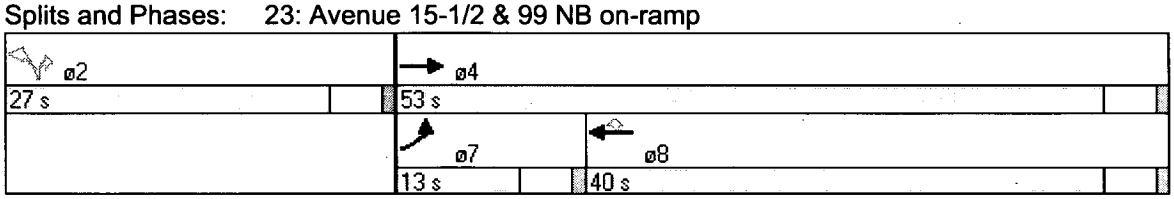
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3471	1553	3242	0	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						500			114			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	287	963	0	0	1299	460	386	0	468	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	312	1047	0	0	1412	500	420	0	509	0	0	0
Lane Group Flow (vph)	312	1047	0	0	1412	500	420	0	509	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	13.0	53.0	0.0	0.0	40.0	40.0	27.0	0.0	27.0	0.0	0.0	0.0
Total Split (%)	16.3%	66.3%	0.0%	0.0%	50.0%	50.0%	33.8%	0.0%	33.8%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	48.4			35.4	35.4	22.4		22.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	9.0	49.0			36.0	36.0	23.0		23.0			
Actuated g/C Ratio	0.11	0.61			0.45	0.45	0.29		0.29			
v/c Ratio	0.81	0.48			0.90	0.51	0.45		1.00			
Control Delay	54.4	1.9			30.4	3.5	25.2		63.6			
Queue Delay	0.0	0.1			0.0	0.0	0.0		0.0			
Total Delay	54.4	2.0			30.4	3.5	25.2		63.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			C	A	C		E			
Approach Delay		14.0			23.3							
Approach LOS		B			C							
Queue Length 50th (ft)	67	11			331	0	88		205			
Queue Length 95th (ft)	#140	23			#480	51	129		#410			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	386	2168			1562	974	932		511			
Starvation Cap Reductn	0	231			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.81	0.54			0.90	0.51	0.45		1.00			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 77 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 25.4 Intersection LOS: C
Intersection Capacity Utilization 65.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3539	1583	3400	0	1568	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						465			3			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	472	2157	0	0	2072	807	794	0	810	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	513	2345	0	0	2252	877	863	0	880	0	0	0
Lane Group Flow (vph)	513	2345	0	0	2252	877	863	0	880	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	15.0	66.0	0.0	0.0	51.0	51.0	44.0	0.0	44.0	0.0	0.0	0.0
Total Split (%)	13.6%	60.0%	0.0%	0.0%	46.4%	46.4%	40.0%	0.0%	40.0%	0.0%	0.0%	0.0%
Maximum Green (s)	10.4	61.4			46.4	46.4	39.4		39.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	11.0	62.0			47.0	47.0	40.0		40.0			
Actuated g/C Ratio	0.10	0.56			0.43	0.43	0.36		0.36			
v/c Ratio	1.50	1.18			1.49	0.93	0.70		1.54			
Control Delay	261.5	99.2			251.2	31.4	33.5		279.3			
Queue Delay	0.0	61.1			0.0	0.0	1.5		0.0			
Total Delay	261.5	160.2			251.2	31.4	35.0		279.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F			F	C	D		F			
Approach Delay		178.4			189.6							
Approach LOS		F			F							
Queue Length 50th (ft)	~259	~1038			~1159	323	265		~882			
Queue Length 95th (ft)	m#227	m#890			#1296	#637	336		#1126			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	343	1995			1512	943	1236		572			
Starvation Cap Reductn	0	208			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	200		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.50	1.31			1.49	0.93	0.83		1.54			

Intersection Summary

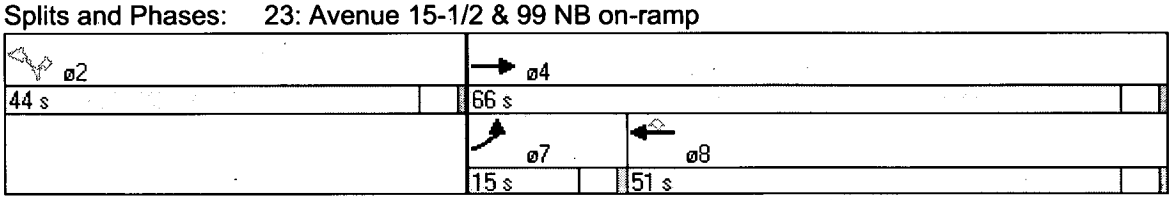
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 109 (99%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.54
Intersection Signal Delay: 178.4 Intersection LOS: F
Intersection Capacity Utilization 183.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



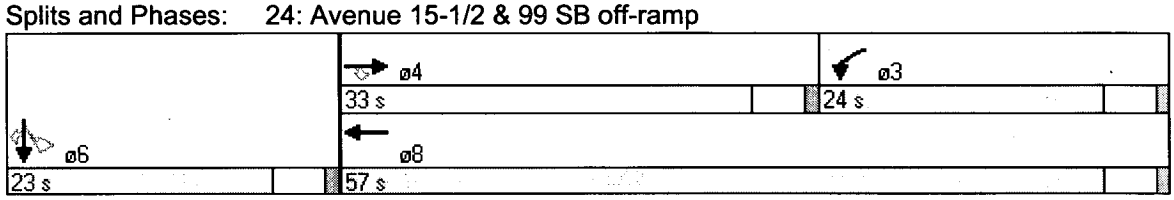
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	3539	1583	3367	3471	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			475									89
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	877	437	535	1150	0	0	0	0	373	1	237
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	953	475	582	1250	0	0	0	0	405	1	258
Lane Group Flow (vph)	0	953	475	582	1250	0	0	0	0	203	203	258
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	33.0	33.0	24.0	57.0	0.0	0.0	0.0	0.0	23.0	23.0	23.0
Total Split (%)	0.0%	41.3%	41.3%	30.0%	71.3%	0.0%	0.0%	0.0%	0.0%	28.8%	28.8%	28.8%
Maximum Green (s)		28.4	28.4	19.4	52.4					18.4	18.4	18.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		32.9	32.9	20.0	56.9					15.1	15.1	15.1
Actuated g/C Ratio		0.41	0.41	0.25	0.71					0.19	0.19	0.19
v/c Ratio		0.66	0.51	0.69	0.51					0.64	0.64	0.69
Control Delay		22.5	4.1	20.6	1.8					38.7	38.6	29.3
Queue Delay		0.0	0.0	0.0	0.3					0.0	0.0	0.0
Total Delay		22.5	4.1	20.6	2.1					38.7	38.6	29.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	A	C	A					D	D	C
Approach Delay		16.4			8.0						35.0	
Approach LOS		B			A						D	
Queue Length 50th (ft)		200	0	131	18					97	97	77
Queue Length 95th (ft)		285	59	m167	m42					161	161	149
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1454	930	842	2467					399	400	444
Starvation Cap Reductn		0	0	0	549					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.66	0.51	0.69	0.65					0.51	0.51	0.58

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 15.6 Intersection LOS: B
Intersection Capacity Utilization 65.1% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
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
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.952	
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1681	1685	1583
Flt Permitted				0.950						0.950	0.952	
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1681	1685	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			643									6
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1828	828	487	2379	0	0	0	0	801	1	392
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1987	900	529	2586	0	0	0	0	871	1	426
Lane Group Flow (vph)	0	1987	900	529	2586	0	0	0	0	436	436	426
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	61.0	61.0	19.0	80.0	0.0	0.0	0.0	0.0	30.0	30.0	30.0
Total Split (%)	0.0%	55.5%	55.5%	17.3%	72.7%	0.0%	0.0%	0.0%	0.0%	27.3%	27.3%	27.3%
Maximum Green (s)		56.4	56.4	14.4	75.4					25.4	25.4	25.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		57.0	57.0	15.0	76.0					26.0	26.0	26.0
Actuated g/C Ratio		0.52	0.52	0.14	0.69					0.24	0.24	0.24
v/c Ratio		1.08	0.80	1.13	1.06					1.10	1.10	1.12
Control Delay		74.6	11.9	97.2	37.3					114.5	113.6	123.3
Queue Delay		5.3	0.0	0.0	93.0					138.7	139.8	0.0
Total Delay		79.9	11.9	97.2	130.3					253.2	253.4	123.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	B	F	F					F	F	F
Approach Delay		58.7			124.7						210.7	
Approach LOS		E			F						F	
Queue Length 50th (ft)		~829	133	~224	~1055					~368	~367	~346
Queue Length 95th (ft)		#967	338	m163	m121					#575	#574	#544
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1834	1130	468	2445					397	398	379
Starvation Cap Reductn		0	0	0	408					0	0	0
Spillback Cap Reductn		21	0	0	0					90	91	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		1.10	0.80	1.13	1.27					1.42	1.42	1.12

Intersection Summary

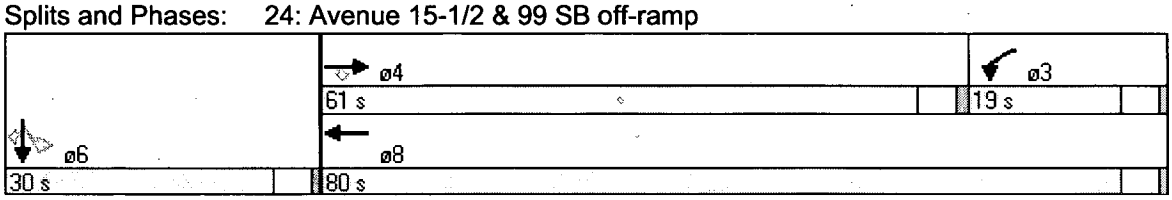
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 108 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 113.9 Intersection LOS: F
Intersection Capacity Utilization 183.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



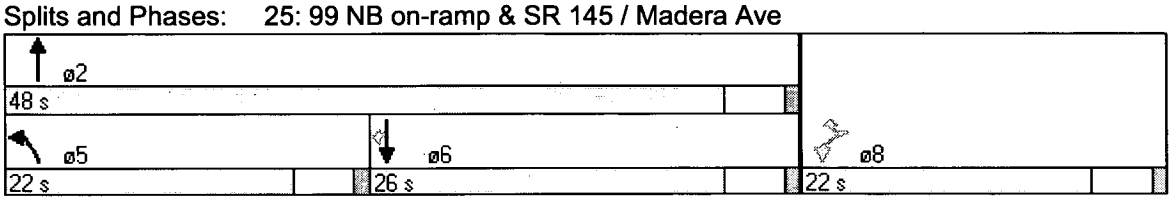
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						53						556
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	678	0	49	682	759	0	0	268	655
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	737	0	53	741	825	0	0	291	712
Lane Group Flow (vph)	0	0	0	737	0	53	741	825	0	0	291	712
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	22.0	0.0	22.0	22.0	48.0	0.0	0.0	26.0	26.0
Total Split (%)	0.0%	0.0%	0.0%	31.4%	0.0%	31.4%	31.4%	68.6%	0.0%	0.0%	37.1%	37.1%
Maximum Green (s)				17.4		17.4	17.4	43.4			21.4	21.4
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				18.0		18.0	18.1	44.0			21.9	21.9
Actuated g/C Ratio				0.26		0.26	0.26	0.63			0.31	0.31
v/c Ratio				0.83		0.12	0.83	0.70			0.50	0.81
Control Delay				34.8		7.3	27.6	7.0			23.4	14.3
Queue Delay				0.0		0.0	0.0	0.4			0.0	0.0
Total Delay				34.8		7.3	27.6	7.3			23.4	14.3
LOS				C		A	C	A			C	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								16.9			16.9	
Approach LOS								B			B	
Queue Length 50th (ft)				154		0	142	158			101	51
Queue Length 95th (ft)				#241		24	m142	m156			170	#261
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				905		456	905	1183			607	890
Starvation Cap Reductn				0		0	0	75			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.81		0.12	0.82	0.74			0.48	0.80

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 40 (57%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 20.7 Intersection LOS: C
Intersection Capacity Utilization 66.7% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
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
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	1863	0	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						470
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	697	0	67	1120	1064	0	0	449	768
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	758	0	73	1217	1157	0	0	488	835
Lane Group Flow (vph)	0	0	0	758	0	73	1217	1157	0	0	488	835
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	26.0	49.4	0.0	0.0	23.4	23.4
Total Split (%)	0.0%	0.0%	0.0%	29.4%	0.0%	29.4%	37.1%	70.6%	0.0%	0.0%	33.4%	33.4%
Maximum Green (s)				16.0		16.0	21.4	44.8			18.8	18.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				16.6		16.6	22.0	45.4			19.4	19.4
Actuated g/C Ratio				0.24		0.24	0.31	0.65			0.28	0.28
v/c Ratio				0.93		0.17	1.13	0.96			0.95	1.07
Control Delay				46.7		7.2	77.8	9.9			55.9	68.1
Queue Delay				0.0		0.0	0.0	36.7			0.0	0.0
Total Delay				46.7		7.2	77.8	46.6			55.9	68.1
LOS				D		A	E	D			E	E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								62.6			63.6	
Approach LOS								E			E	
Queue Length 50th (ft)				164		0	~312	114			205	~245
Queue Length 95th (ft)				#268		29	m115	m70			#382	#456
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				814		431	1079	1208			516	778
Starvation Cap Reductn				0		0	0	142			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.93		0.17	1.13	1.09			0.95	1.07

Intersection Summary

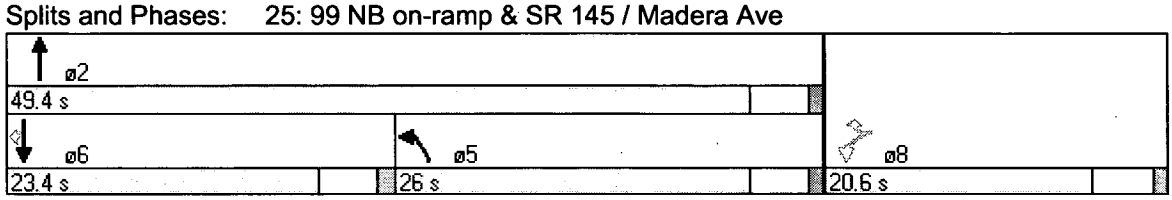
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 3 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 59.4 Intersection LOS: E
Intersection Capacity Utilization 86.2% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1752	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1752	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						97
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	791	719	0	812	372
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	860	782	0	883	404
Lane Group Flow (vph)	0	860	782	0	883	404
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	34.0	34.0	0.0	36.0	36.0
Total Split (%)	0.0%	48.6%	48.6%	0.0%	51.4%	51.4%
Maximum Green (s)		29.4	29.4		31.4	31.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		30.0	30.0		32.0	32.0
Actuated g/C Ratio		0.43	0.43		0.46	0.46
v/c Ratio		1.08	0.98		1.10	0.53
Control Delay		77.8	35.1		85.7	13.0
Queue Delay		111.5	63.4		3.4	0.0
Total Delay		189.3	98.5		89.1	13.0
LOS		F	F		F	B
Approach Delay		189.3	98.5		65.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		F	F		E	
Queue Length 50th (ft)		~423	204		~443	86
Queue Length 95th (ft)		#629	m#448		#652	163
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		798	798		801	769
Starvation Cap Reductn		0	123		0	0
Spillback Cap Reductn		154	0		6	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.34	1.16		1.11	0.53

Intersection Summary

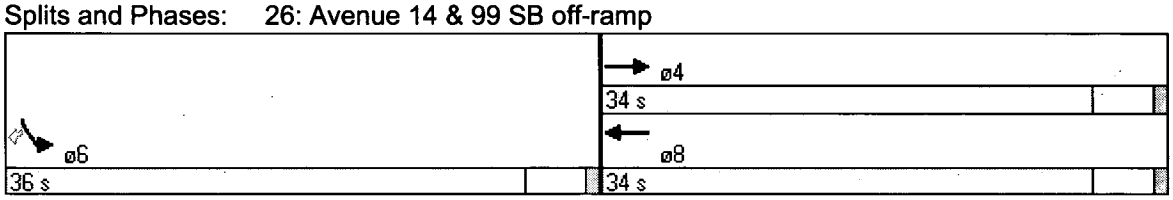
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 9 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 110.5 Intersection LOS: F
Intersection Capacity Utilization 93.3% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						79
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	1118	778	0	1166	312
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1215	846	0	1267	339
Lane Group Flow (vph)	0	1215	846	0	1267	339
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	34.0	34.0	0.0	36.0	36.0
Total Split (%)	0.0%	48.6%	48.6%	0.0%	51.4%	51.4%
Maximum Green (s)		29.4	29.4		31.4	31.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		30.0	30.0		32.0	32.0
Actuated g/C Ratio		0.43	0.43		0.46	0.46
v/c Ratio		1.52	1.06		1.57	0.44
Control Delay		263.7	47.7		282.4	11.9
Queue Delay		116.4	86.8		71.9	0.0
Total Delay		380.1	134.4		354.3	11.9
LOS		F	F		F	B
Approach Delay		380.1	134.4		282.0	
Approach LOS		F	F		F	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		~748	~391		~791	70
Queue Length 95th (ft)		#976	m#411		#1021	132
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		798	798		809	767
Starvation Cap Reductn		0	129		0	0
Spillback Cap Reductn		116	0		75	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.78	1.26		1.73	0.44

Intersection Summary

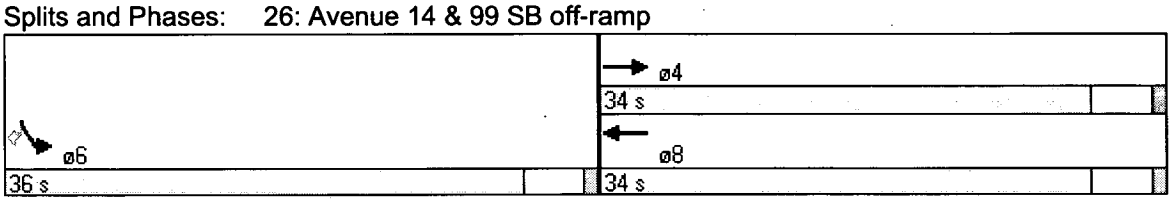
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 4 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.57
Intersection Signal Delay: 280.4 Intersection LOS: F
Intersection Capacity Utilization 130.1% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.996	
Satd. Flow (prot)	3335	1810	1538	0	0	0	1752	1845	1568	0	3491	1568
Flt Permitted	0.950						0.950				0.587	
Satd. Flow (perm)	3335	1810	1538	0	0	0	1752	1845	1568	0	2057	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			482						98			458
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	382	363	858	0	0	0	298	1059	90	40	485	421
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	415	395	933	0	0	0	324	1151	98	43	527	458
Lane Group Flow (vph)	415	395	933	0	0	0	324	1151	98	0	570	458
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	27.0	27.0	27.0	0.0	0.0	0.0	17.3	43.0	43.0	25.7	25.7	25.7
Total Split (%)	38.6%	38.6%	38.6%	0.0%	0.0%	0.0%	24.7%	61.4%	61.4%	36.7%	36.7%	36.7%
Maximum Green (s)	22.4	22.4	22.4				12.7	38.4	38.4	21.1	21.1	21.1
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	23.0	23.0	23.0				13.6	39.0	39.0		21.4	21.4
Actuated g/C Ratio	0.33	0.33	0.33				0.19	0.56	0.56		0.31	0.31
v/c Ratio	0.38	0.66	1.13				0.95	1.12	0.11		0.91	0.57
Control Delay	18.3	21.2	72.9				69.2	86.0	2.1		25.6	4.0
Queue Delay	25.8	251.1	123.3				6.6	0.0	0.0		0.0	4.4
Total Delay	44.1	272.3	196.2				75.8	86.0	2.1		25.6	8.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	F	F				E	F	A		C	A
Approach Delay		177.2						78.7			17.9	
Approach LOS		F						E			B	
Queue Length 50th (ft)	73	140	~318				140	~584	0		42	10
Queue Length 95th (ft)	m65	m129	m#212				#289	#809	18		m#169	m16
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1096	595	829				341	1028	917		638	802
Starvation Cap Reductn	684	340	165				0	0	0		0	0
Spillback Cap Reductn	12	0	0				12	0	0		0	264
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.01	1.55	1.41				0.98	1.12	0.11		0.89	0.85

Intersection Summary

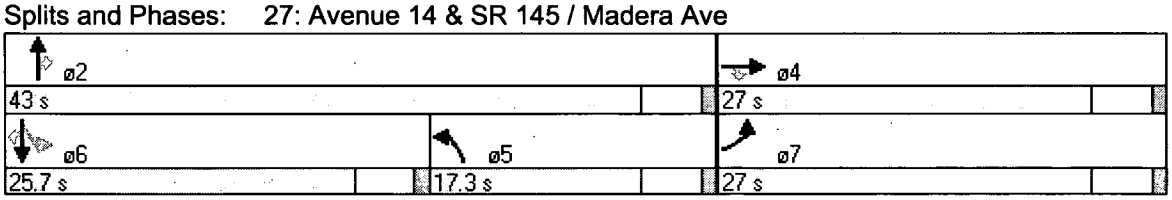
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 103.9 Intersection LOS: F
Intersection Capacity Utilization 99.4% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		1	0		0	1		1	0		1
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
Leading Detector (ft)	50	50	50				50	50	50	50	50	50
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850						0.850			0.850
Flt Protected	0.950						0.950				0.994	
Satd. Flow (prot)	3367	1827	1553	0	0	0	1770	1863	1583	0	3518	1583
Flt Permitted	0.950						0.950				0.604	
Satd. Flow (perm)	3367	1827	1553	0	0	0	1770	1863	1583	0	2138	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			379						63			475
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	471	547	1266	0	0	0	341	1713	96	82	627	437
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	512	595	1376	0	0	0	371	1862	104	89	682	475
Lane Group Flow (vph)	512	595	1376	0	0	0	371	1862	104	0	771	475
Turn Type	Prot		Perm				Prot		Perm	Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4						2	6		6
Detector Phases	7	4	4				5	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6	20.6	20.6	20.6	20.6
Total Split (s)	31.0	31.0	31.0	0.0	0.0	0.0	14.0	39.0	39.0	25.0	25.0	25.0
Total Split (%)	44.3%	44.3%	44.3%	0.0%	0.0%	0.0%	20.0%	55.7%	55.7%	35.7%	35.7%	35.7%
Maximum Green (s)	26.4	26.4	26.4				9.4	34.4	34.4	20.4	20.4	20.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0	0	0	0	0
Act Effct Green (s)	27.0	27.0	27.0				10.0	35.0	35.0		21.0	21.0
Actuated g/C Ratio	0.39	0.39	0.39				0.14	0.50	0.50		0.30	0.30
v/c Ratio	0.39	0.84	1.65				1.47	2.00	0.13		1.20	0.59
Control Delay	14.5	21.0	312.9				257.8	472.3	5.0		123.0	12.9
Queue Delay	105.0	485.9	246.4				78.3	0.0	0.0		0.0	2.0
Total Delay	119.5	506.9	559.4				336.1	472.3	5.0		123.0	14.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F	F				F	F	A		F	B
Approach Delay		456.1						429.8			81.8	
Approach LOS		F						F			F	
Queue Length 50th (ft)	73	215	~886				~224	~1281	9		~230	107
Queue Length 95th (ft)	m43	m116	m#251				#378	#1530	31		m#257	m126
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250		250			
Base Capacity (vph)	1299	705	832				253	932	823		641	807
Starvation Cap Reductn	879	419	207				0	0	0		0	0
Spillback Cap Reductn	0	0	0				27	0	0		0	193
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	1.22	2.08	2.20				1.64	2.00	0.13		1.20	0.77

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 20 (29%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.00
Intersection Signal Delay: 369.1 Intersection LOS: F
Intersection Capacity Utilization 148.7% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave

ø2	ø4
39 s	31 s

ø5	ø6	ø7
14 s	25 s	31 s

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	426			312	225
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	71	484	0	0	354	255
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						250
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	284
Percent Heavy Vehicles	0	0	0	0	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	71							284
C (m) (veh/h)	820							540
v/c	0.09							0.53
95% queue length	0.28							3.04
Control Delay (s/veh)	9.8							18.8
LOS	A							C
Approach Delay (s/veh)	–	–				18.8		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 6:32 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2 | North/South Street: Pistachio

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	610			480	263
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	693	0	0	545	298
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						280
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	318
Percent Heavy Vehicles	0	0	0	0	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT							R
v (veh/h)	82							318
C (m) (veh/h)	671							433
v/c	0.12							0.73
95% queue length	0.42							5.89
Control Delay (s/veh)	11.1							33.0
LOS	B							D
Approach Delay (s/veh)	–	–				33.0		
Approach LOS	–	–				D		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 6:33 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Godlen State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	40	52	450	51	115
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	5	45	59	511	57	130
Percent Heavy Vehicles	8	–	–	46	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	31	78	251	111	44	4
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	35	88	285	126	50	4
Percent Heavy Vehicles	20	20	20	79	79	79
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	5	511		408			180	
C (m) (veh/h)	1352	1253		171			0	
v/c	0.00	0.41		2.39				
95% queue length	0.01	2.02		34.11				
Control Delay (s/veh)	7.7	9.8		684.1				
LOS	A	A		F			F	
Approach Delay (s/veh)	–	–	684.1					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 5:13 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ GSB / Road 23
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Golden State / Road 23
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	12	90	77	601	100	127
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	13	102	87	682	113	144
Percent Heavy Vehicles	5	–	–	49	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	42	90	412	127	63	5
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	47	102	468	144	71	5
Percent Heavy Vehicles	20	20	20	48	48	48
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	13	682		617			220	
C (m) (veh/h)	1290	1147		0			0	
v/c	0.01	0.59						
95% queue length	0.03	4.11						
Control Delay (s/veh)	7.8	12.6						
LOS	A	B		F			F	
Approach Delay (s/veh)	–	–						
Approach LOS	–	–						

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/30/2006 5:14 PM

ATTACHMENT VI – C - 34

2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 23 Critical Approach Speed 45 mph

MINOR STREET: AVENUE 18 Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☐ URBAN (U)

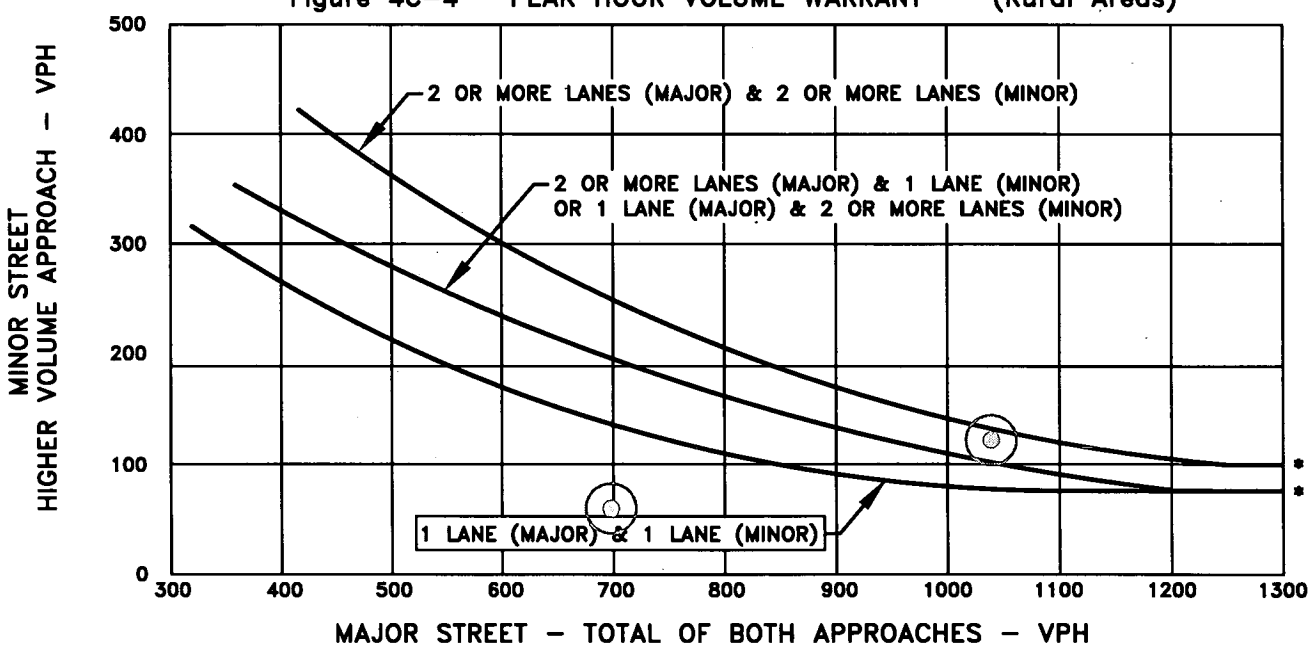
CONDITION: 2030 PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		698	1039				
Highest Approaches – Minor Street	✓		60	122				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

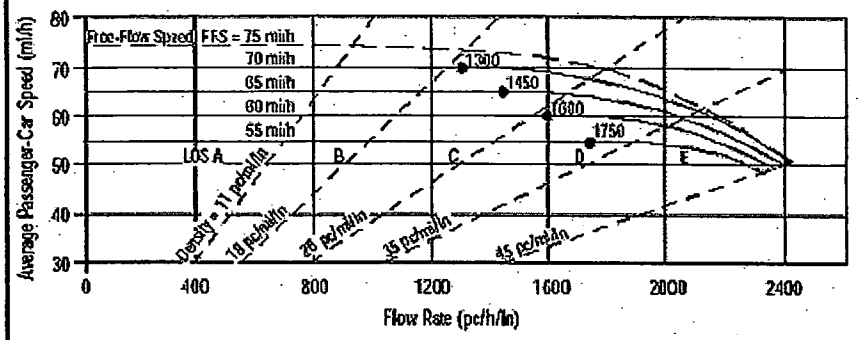
ATTACHMENT VI – C - 35

MITIGATED 2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period		Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4266*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1303*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*18.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

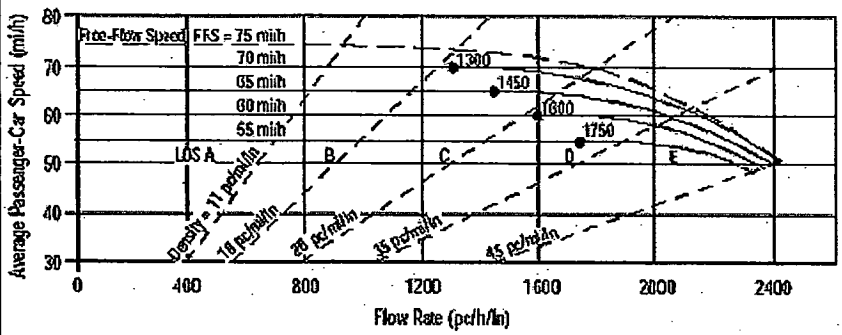
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4418*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1349*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*19.3*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

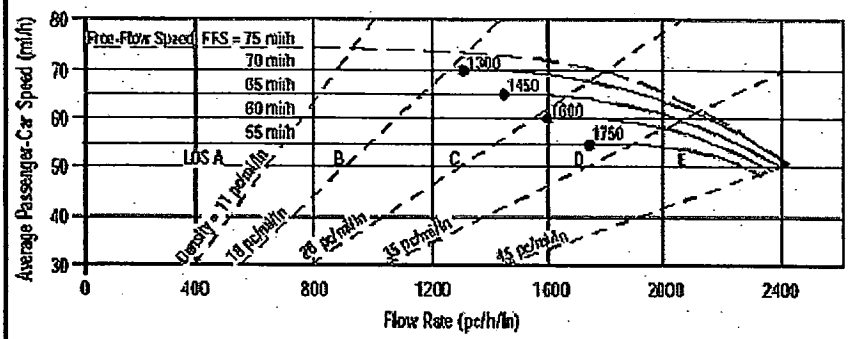
N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

Factor Location

E_R - Exhibits23-8, 23-10
E_T - Exhibits 23-8, 23-10, 23-11
f_p - Page 23-12
LOS, S, FFS, v_p - Exhibits 23-2, 23-3
f_{LW} - Exhibit 23-4
f_{LC} - Exhibit 23-5
f_N - Exhibit 23-6
f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3539*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

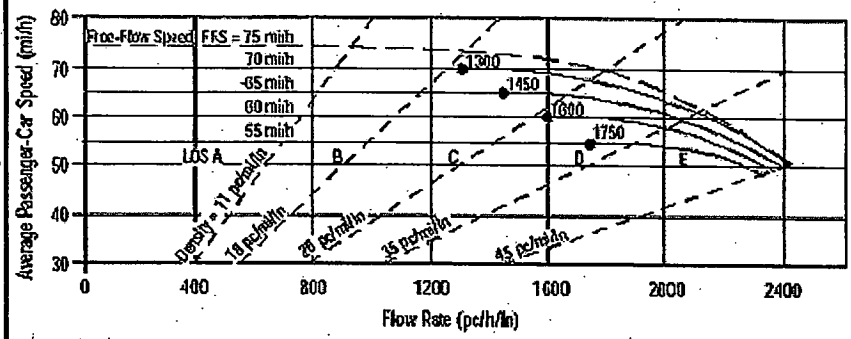
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	i/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1081*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*15.4*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2030 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*North of Avenue 18 1/2*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5356*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1636*	pc/h/ln
S	*69.2*	mi/h
D = v_p / S	*23.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

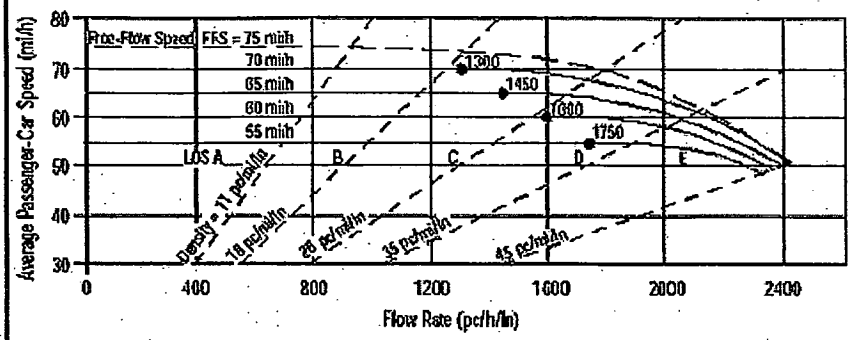
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period		Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4635*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

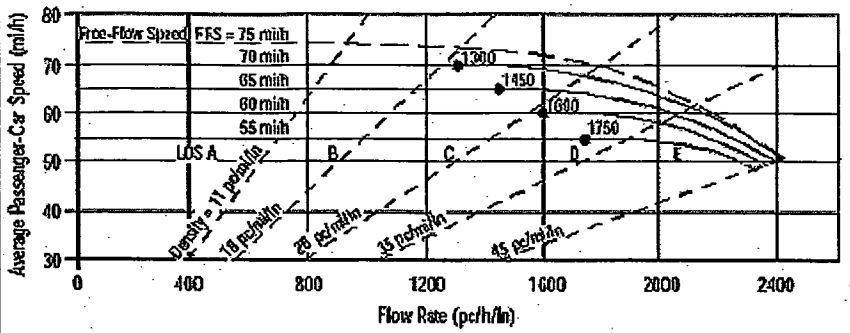
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1416*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*20.2*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4699*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

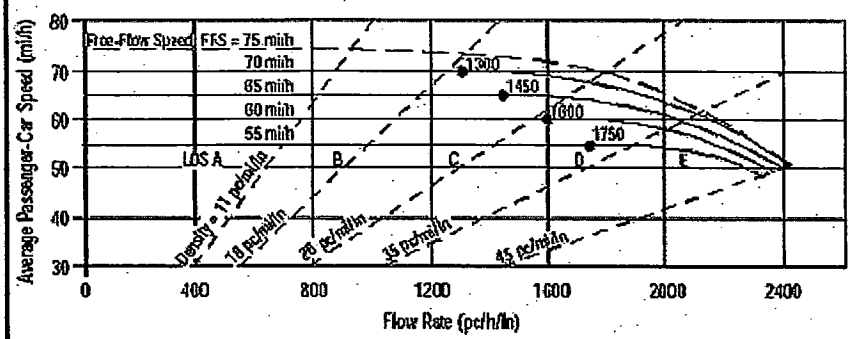
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1435*	pc/h/ln	Design LOS		
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*20.5*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3793*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

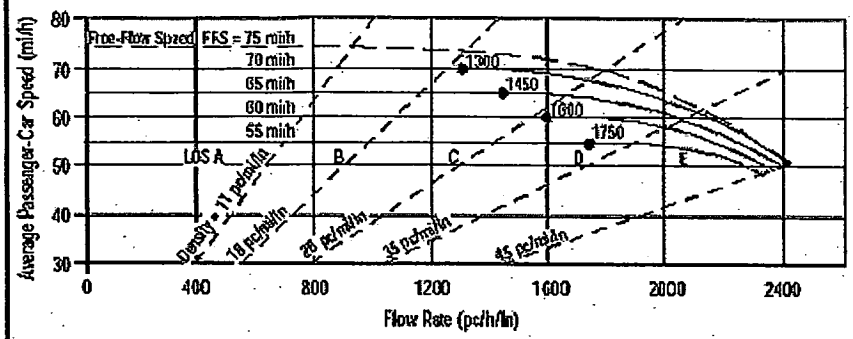
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1159*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*16.6*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2030 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5733*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1751*	pc/h/ln
S	*68.4*	mi/h
D = v_p / S	*25.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

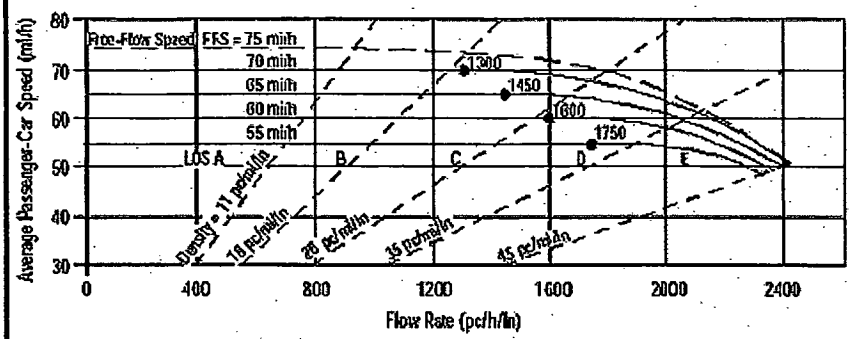
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period		Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5419*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

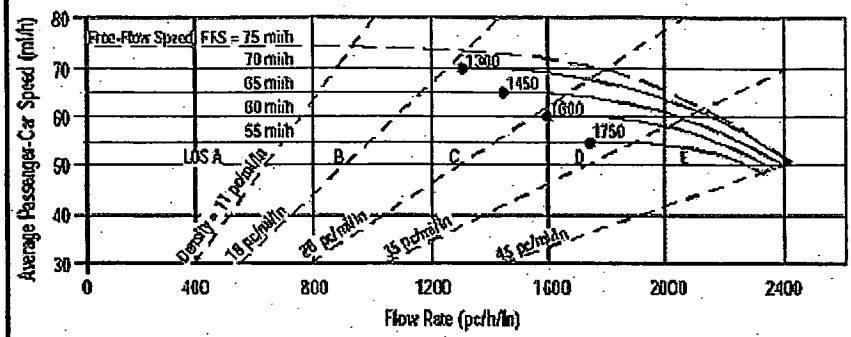
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1655*	pc/h/ln	Design LOS	
S	*69.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*23.9*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6423*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

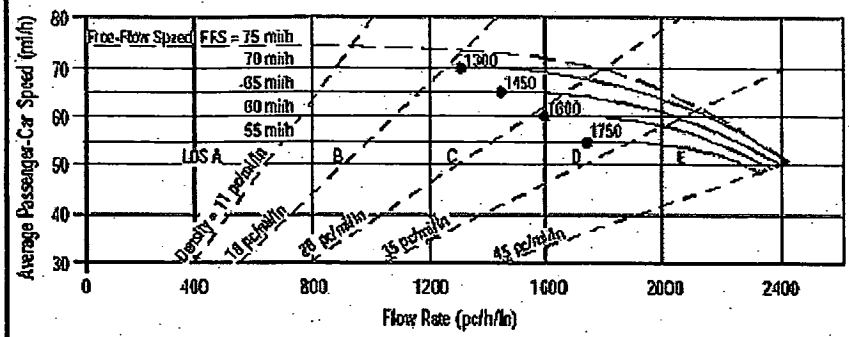
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1962*	pc/h/ln	Design LOS	
S	*65.5*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*29.9*	pc/mi/ln	S	mi/h
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4092*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1250*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*17.9*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

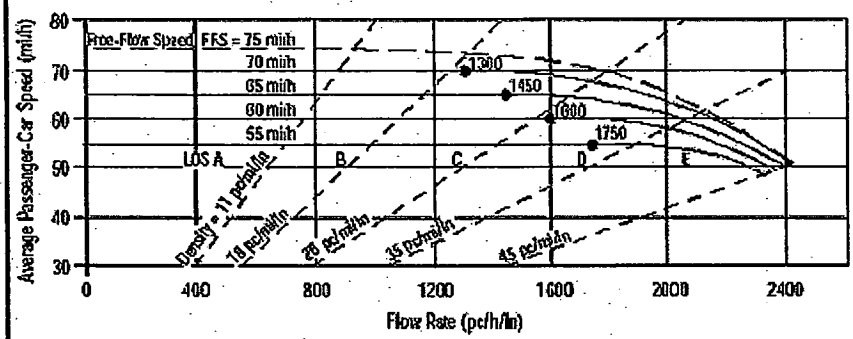
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2008*

Project Description 04-837.1 Northfork Casino Alt A

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7116*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2173*	pc/h/ln
S	*60.9*	mi/h
D = v_p / S	*35.7*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 36

MITIGATED 2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE A

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	2798	2959	0	1318	1179
Flt Permitted					0.950	
Satd. Flow (perm)	0	2798	2959	0	1318	1179
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						319
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	507	301	0	34	281
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	576	342	0	39	319
Lane Group Flow (vph)	0	576	342	0	39	319
Turn Type						custom
Protected Phases		4	8			
Permitted Phases					6	6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.9	20.9		20.9	20.9
Total Split (s)	0.0	38.3	38.3	0.0	41.7	41.7
Total Split (%)	0.0%	47.9%	47.9%	0.0%	52.1%	52.1%
Maximum Green (s)		33.7	33.7		37.1	37.1
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Max	Max
Act Effct Green (s)		34.3	34.3		37.7	37.7
Actuated g/C Ratio		0.43	0.43		0.47	0.47
v/c Ratio		0.48	0.27		0.06	0.44
Control Delay		13.2	3.8		12.0	3.7
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		13.2	3.8		12.0	3.7
LOS		B	A		B	A
Approach Delay		13.2	3.8		4.6	
Approach LOS		B	A		A	
90th %ile Green (s)		33.7	33.7		37.1	37.1
90th %ile Term Code		Coord	Coord		MaxR	MaxR

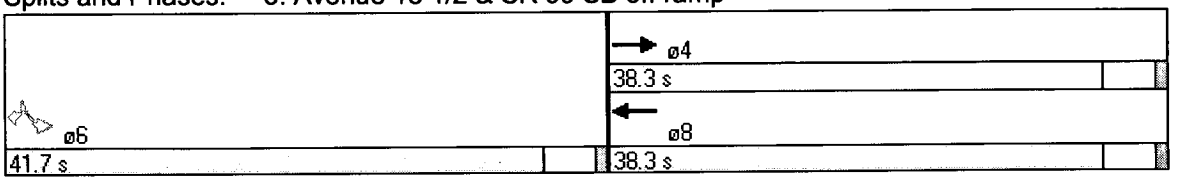
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		33.7	33.7		37.1	37.1
70th %ile Term Code		Coord	Coord		MaxR	MaxR
50th %ile Green (s)		33.7	33.7		37.1	37.1
50th %ile Term Code		Coord	Coord		MaxR	MaxR
30th %ile Green (s)		33.7	33.7		37.1	37.1
30th %ile Term Code		Coord	Coord		MaxR	MaxR
10th %ile Green (s)		33.7	33.7		37.1	37.1
10th %ile Term Code		Coord	Coord		MaxR	MaxR
Queue Length 50th (ft)		83	7		10	0
Queue Length 95th (ft)		m91	m7		26	39
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		1200	1269		621	724
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.48	0.27		0.06	0.44

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 75 (94%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 8.3 Intersection LOS: A
Intersection Capacity Utilization 42.6% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	2798	2959	0	1318	1179
Flt Permitted					0.950	
Satd. Flow (perm)	0	2798	2959	0	1318	1179
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						304
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	699	352	0	65	441
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	794	400	0	74	501
Lane Group Flow (vph)	0	794	400	0	74	501
Turn Type						custom
Protected Phases		4	8			
Permitted Phases					6	6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.9	20.9		20.9	20.9
Total Split (s)	0.0	36.5	36.5	0.0	43.5	43.5
Total Split (%)	0.0%	45.6%	45.6%	0.0%	54.4%	54.4%
Maximum Green (s)		31.9	31.9		38.9	38.9
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Max	Max
Act Effct Green (s)		32.5	32.5		39.5	39.5
Actuated g/C Ratio		0.41	0.41		0.49	0.49
v/c Ratio		0.70	0.33		0.11	0.68
Control Delay		19.1	4.4		11.5	11.2
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		19.1	4.4		11.5	11.2
LOS		B	A		B	B
Approach Delay		19.1	4.4		11.2	
Approach LOS		B	A		B	
90th %ile Green (s)		31.9	31.9		38.9	38.9
90th %ile Term Code		Coord	Coord		MaxR	MaxR

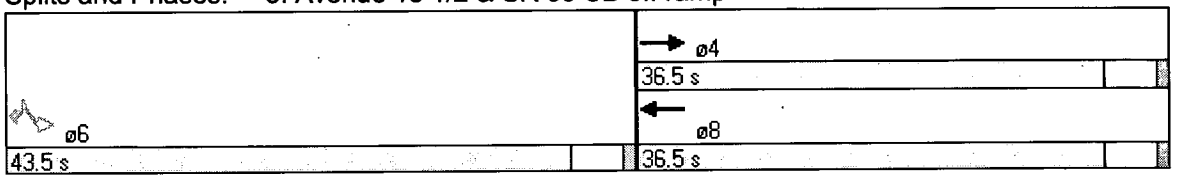
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		31.9	31.9		38.9	38.9
70th %ile Term Code		Coord	Coord		MaxR	MaxR
50th %ile Green (s)		31.9	31.9		38.9	38.9
50th %ile Term Code		Coord	Coord		MaxR	MaxR
30th %ile Green (s)		31.9	31.9		38.9	38.9
30th %ile Term Code		Coord	Coord		MaxR	MaxR
10th %ile Green (s)		31.9	31.9		38.9	38.9
10th %ile Term Code		Coord	Coord		MaxR	MaxR
Queue Length 50th (ft)		163	31		19	60
Queue Length 95th (ft)		214	m30		40	164
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		1137	1202		651	736
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.70	0.33		0.11	0.68

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 30 (38%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 53.1% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	2		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.957				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	2366	2439	0	0	3170	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	2366	2439	0	0	3170	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					55				19			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	259	85	0	0	119	48	243	0	36	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	294	97	0	0	135	55	276	0	41	0	0	0
Lane Group Flow (vph)	294	97	0	0	190	0	0	276	41	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	31.0	53.0	0.0	0.0	22.0	0.0	27.0	27.0	27.0	0.0	0.0	0.0
Total Split (%)	38.8%	66.3%	0.0%	0.0%	27.5%	0.0%	33.8%	33.8%	33.8%	0.0%	0.0%	0.0%
Maximum Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	27.0	51.8			20.8			20.2	20.2			
Actuated g/C Ratio	0.34	0.65			0.26			0.25	0.25			
v/c Ratio	0.37	0.06			0.22			0.82	0.13			
Control Delay	6.9	1.4			18.2			48.0	14.9			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	6.9	1.4			18.2			48.0	14.9			

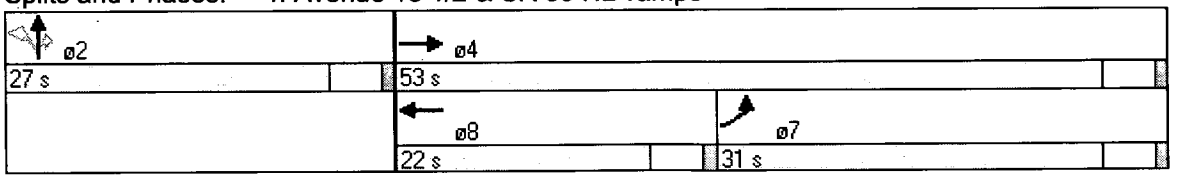
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A			B			D	B			
Approach Delay		5.5			18.2			43.7				
Approach LOS		A			B			D				
90th %ile Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
90th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
70th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	26.4	49.1			18.1		21.7	21.7	21.7			
50th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
30th %ile Green (s)	26.4	52.6			21.6		18.2	18.2	18.2			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	26.4	57.6			26.6		13.2	13.2	13.2			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	20	1			28			125	8			
Queue Length 95th (ft)	31	3			54			#224	30			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	799	1580			866			384	357			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.37	0.06			0.22			0.72	0.11			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 78 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 21.7 Intersection LOS: C
Intersection Capacity Utilization 35.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	2		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.975				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	2870	2959	0	0	3061	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	2870	2959	0	0	3061	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					27				34			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	390	123	0	0	173	35	281	0	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	443	140	0	0	197	40	319	0	89	0	0	0
Lane Group Flow (vph)	443	140	0	0	237	0	0	319	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	33.0	55.0	0.0	0.0	22.0	0.0	25.0	25.0	25.0	0.0	0.0	0.0
Total Split (%)	41.3%	68.8%	0.0%	0.0%	27.5%	0.0%	31.3%	31.3%	31.3%	0.0%	0.0%	0.0%
Maximum Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	29.0	52.3			19.3			19.7	19.7			
Actuated g/C Ratio	0.36	0.65			0.24			0.25	0.25			
v/c Ratio	0.43	0.07			0.31			0.86	0.25			
Control Delay	5.4	2.0			23.9			52.1	17.6			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	5.4	2.0			23.9			52.1	17.6			

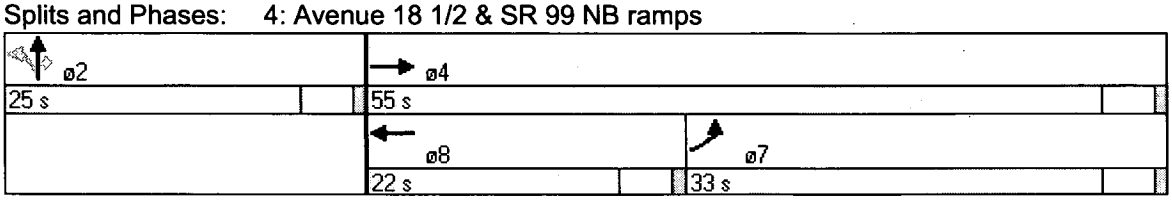
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A			C			D	B			
Approach Delay		4.6			23.9			44.6				
Approach LOS		A			C			D				
90th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
70th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
50th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	28.4	51.2			18.2		19.6	19.6	19.6			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	28.4	56.0			23.0		14.8	14.8	14.8			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	14	3			46			149	21			
Queue Length 95th (ft)	21	m5			75			#271	56			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	1040	1933			758			395	378			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.43	0.07			0.31			0.81	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 27 (34%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 21.6 Intersection LOS: C
Intersection Capacity Utilization 43.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



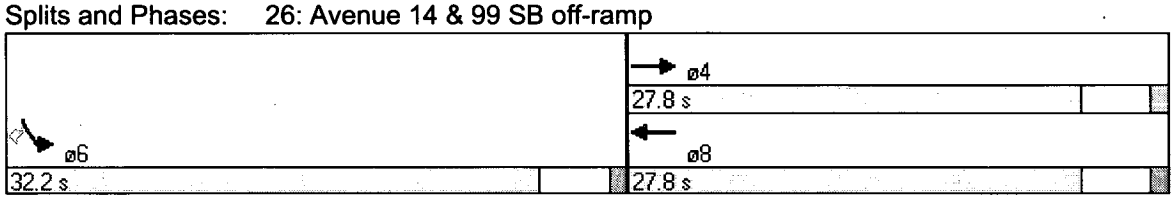
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	3539	0	3400	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	3400	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						79
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	793	719	0	809	371
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	862	782	0	879	403
Lane Group Flow (vph)	0	862	782	0	879	403
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	27.8	27.8	0.0	32.2	32.2
Total Split (%)	0.0%	46.3%	46.3%	0.0%	53.7%	53.7%
Maximum Green (s)		23.2	23.2		27.6	27.6
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		29.1	29.1		22.9	22.9
Actuated g/C Ratio		0.48	0.48		0.38	0.38
v/c Ratio		0.50	0.45		0.68	0.62
Control Delay		12.9	6.7		17.8	15.7
Queue Delay		0.0	0.9		0.0	0.0
Total Delay		12.9	7.7		17.8	15.7
LOS		B	A		B	B
Approach Delay		12.9	7.7		17.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		B	
Queue Length 50th (ft)		105	30		130	89
Queue Length 95th (ft)		178	88		156	143
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1719	1719		1598	779
Starvation Cap Reductn		0	615		0	0
Spillback Cap Reductn		46	0		16	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.52	0.71		0.56	0.52

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 6 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.4 Intersection LOS: B
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	4988	4803	0	3242	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	4988	4803	0	3242	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						4
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	2966	2372	0	334	347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	3370	2695	0	380	394
Lane Group Flow (vph)	0	3370	2695	0	380	394
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	70.5	70.5	0.0	29.5	29.5
Total Split (%)	0.0%	70.5%	70.5%	0.0%	29.5%	29.5%
Maximum Green (s)		65.2	65.2		24.2	24.2
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		66.5	66.5		25.5	25.5
Actuated g/C Ratio		0.66	0.66		0.26	0.26
v/c Ratio		1.02	0.84		0.46	1.03
Control Delay		20.3	7.7		33.6	90.7
Queue Delay		3.8	0.1		0.0	0.0
Total Delay		24.1	7.7		33.6	90.7
LOS		C	A		C	F
Approach Delay		24.1	7.7		62.6	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		C	A		E	
Queue Length 50th (ft)		~102	354		105	~268
Queue Length 95th (ft)		m#123	m249		145	#438
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		3317	3194		827	384
Starvation Cap Reductn		36	0		0	0
Spillback Cap Reductn		0	34		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.03	0.85		0.46	1.03

Intersection Summary

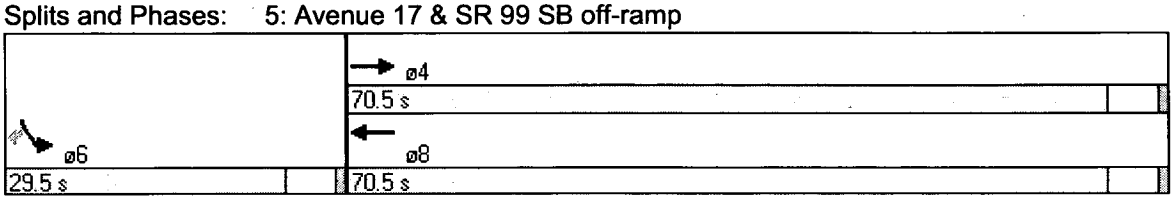
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 67 (67%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 22.0 Intersection LOS: C
Intersection Capacity Utilization 77.7% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.91	0.91	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.957				
Satd. Flow (prot)	3400	5036	0	0	5085	1583	3221	1622	2787	0	0	0
Flt Permitted	0.950						0.950	0.957				
Satd. Flow (perm)	3400	5036	0	0	5085	1583	3221	1622	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						81			434			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	146	411	0	0	793	71	1299	47	382	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	166	467	0	0	901	81	1476	53	434	0	0	0
Lane Group Flow (vph)	166	467	0	0	901	81	1002	527	434	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	10.0	33.0	0.0	0.0	23.0	23.0	37.0	37.0	37.0	0.0	0.0	0.0
Total Split (%)	14.3%	47.1%	0.0%	0.0%	32.9%	32.9%	52.9%	52.9%	52.9%	0.0%	0.0%	0.0%
Maximum Green (s)	4.7	27.7			17.7	17.7	31.7	31.7	31.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	6.9	31.4			20.5	20.5	30.6	30.6	30.6			
Actuated g/C Ratio	0.10	0.45			0.29	0.29	0.44	0.44	0.44			
v/c Ratio	0.50	0.21			0.61	0.16	0.71	0.74	0.30			
Control Delay	28.6	6.2			23.9	6.2	19.0	23.4	1.8			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	28.6	6.2			23.9	6.2	19.0	23.4	1.8			
LOS	C	A			C	A	B	C	A			
Approach Delay		12.1			22.4			16.4				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			B				
Queue Length 50th (ft)	27	30			125	0	172	184	0			
Queue Length 95th (ft)	54	48			161	28	229	292	21			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	335	2259			1489	521	1518	765	1543			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.50	0.21			0.61	0.16	0.66	0.69	0.28			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 25 (36%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 17.3 Intersection LOS: B
Intersection Capacity Utilization 54.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.91	0.91	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	3433	5085	0	0	5085	1583	3221	1615	2787	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	3433	5085	0	0	5085	1583	3221	1615	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						258			41			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	220	1021	0	0	1400	236	1854	5	1379	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	250	1160	0	0	1591	268	2107	6	1567	0	0	0
Lane Group Flow (vph)	250	1160	0	0	1591	268	1405	708	1567	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	11.6	45.0	0.0	0.0	33.4	33.4	55.0	55.0	55.0	0.0	0.0	0.0
Total Split (%)	11.6%	45.0%	0.0%	0.0%	33.4%	33.4%	55.0%	55.0%	55.0%	0.0%	0.0%	0.0%
Maximum Green (s)	6.3	39.7			28.1	28.1	49.7	49.7	49.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	7.6	41.0			29.4	29.4	51.0	51.0	51.0			
Actuated g/C Ratio	0.08	0.41			0.29	0.29	0.51	0.51	0.51			
v/c Ratio	0.96	0.56			1.06	0.41	0.86	0.86	1.09			
Control Delay	65.9	20.0			77.4	6.2	27.9	34.0	76.1			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	65.9	20.0			77.4	6.2	27.9	34.0	76.1			
LOS	E	B			E	A	C	C	E			
Approach Delay		28.1			67.1			49.6				
Approach LOS		C			E			D				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	80	156			~412	5	409	414	~635			
Queue Length 95th (ft)	m83	m155			#488	58	497	#648	#756			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	261	2085			1495	648	1643	824	1441			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.96	0.56			1.06	0.41	0.86	0.86	1.09			

Intersection Summary

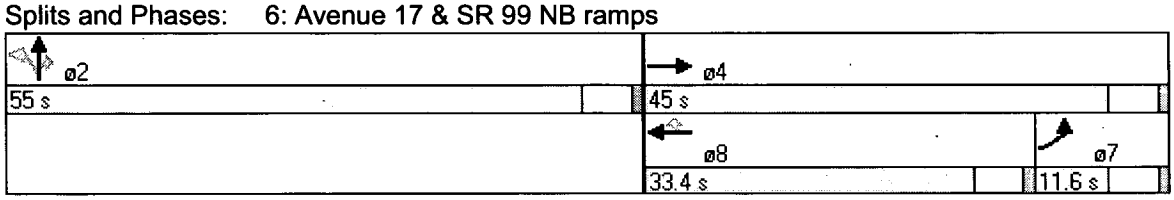
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 89 (89%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 49.9 Intersection LOS: D
Intersection Capacity Utilization 77.7% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



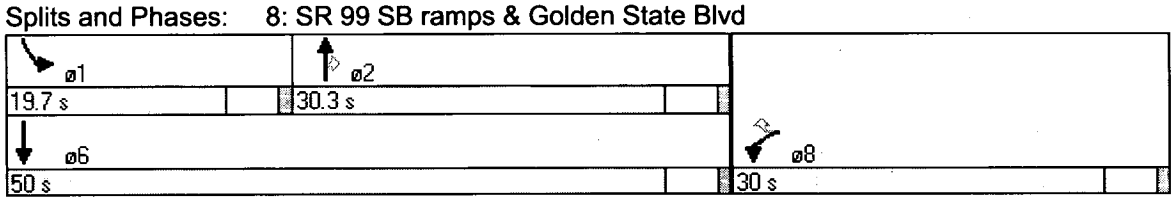
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	0.97	1.00	1.00	1.00	0.97	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3155	1455	1863	1583	3433	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3155	1455	1863	1583	3433	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		340		462		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	534	299	89	407	276	87
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	607	340	101	462	314	99
Lane Group Flow (vph)	607	340	101	462	314	99
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6	20.6	8.6	20.6
Total Split (s)	30.0	30.0	30.3	30.3	19.7	50.0
Total Split (%)	37.5%	37.5%	37.9%	37.9%	24.6%	62.5%
Maximum Green (s)	25.4	25.4	25.7	25.7	15.1	45.4
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	22.3	22.3	32.7	32.7	13.0	49.7
Actuated g/C Ratio	0.28	0.28	0.41	0.41	0.16	0.62
v/c Ratio	0.69	0.52	0.13	0.50	0.56	0.09
Control Delay	29.4	5.4	5.9	4.9	34.6	7.8
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	29.4	5.4	5.9	5.4	34.6	7.8
LOS	C	A	A	A	C	A
Approach Delay	20.8		5.5			28.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	C		A			C
Queue Length 50th (ft)	139	0	8	4	75	18
Queue Length 95th (ft)	161	47	m48	221	106	46
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	1057	714	785	934	682	1176
Starvation Cap Reductn	0	0	0	172	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.48	0.13	0.61	0.46	0.08

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 11 (14%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 17.9 Intersection LOS: B
Intersection Capacity Utilization 39.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



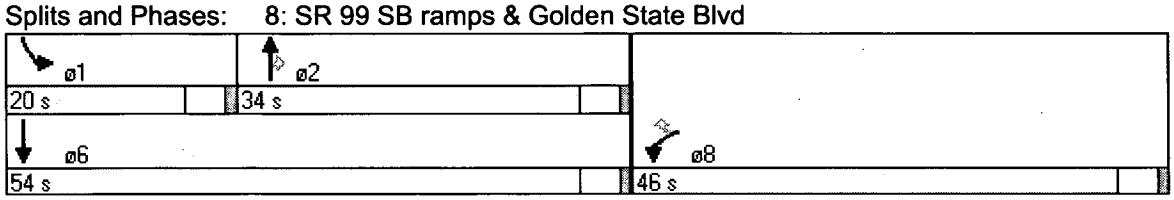
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	0.97	1.00	1.00	1.00	0.97	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3335	1538	1863	1583	3183	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3335	1538	1863	1583	3183	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		733		636		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	957	778	143	560	350	131
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	1088	884	162	636	398	149
Lane Group Flow (vph)	1088	884	162	636	398	149
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6	20.6	8.6	20.6
Total Split (s)	46.0	46.0	34.0	34.0	20.0	54.0
Total Split (%)	46.0%	46.0%	34.0%	34.0%	20.0%	54.0%
Maximum Green (s)	41.4	41.4	29.4	29.4	15.4	49.4
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	44.1	44.1	27.6	27.6	16.3	47.9
Actuated g/C Ratio	0.44	0.44	0.28	0.28	0.16	0.48
v/c Ratio	0.74	0.81	0.31	0.71	0.77	0.18
Control Delay	26.4	10.9	14.5	11.2	51.1	17.0
Queue Delay	0.2	0.0	0.0	4.3	0.0	0.0
Total Delay	26.6	10.9	14.5	15.5	51.1	17.0
LOS	C	B	B	B	D	B
Approach Delay	19.5		15.3			41.8

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		B			D
Queue Length 50th (ft)	268	54	49	159	122	56
Queue Length 95th (ft)	354	229	m48	m177	#185	88
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	1534	1103	600	941	532	896
Starvation Cap Reductn	0	0	0	226	0	0
Spillback Cap Reductn	58	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.80	0.27	0.89	0.75	0.17

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 4 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 62.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



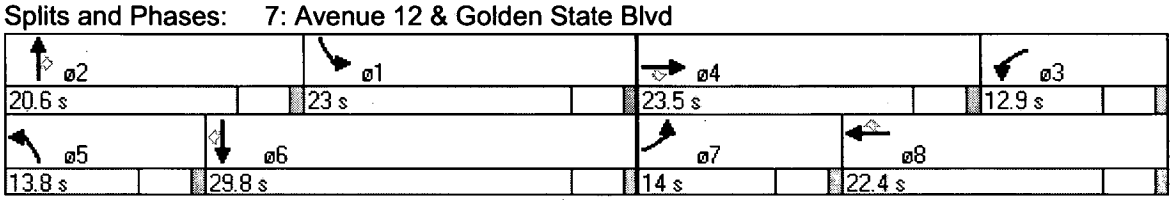
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	2		1	1		1	1		2	2		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3183	3282	1468	1703	3406	1524	1612	1696	2538	3335	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3183	3282	1468	1703	3406	1524	1612	1696	2538	3335	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26			267			441			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	242	296	24	113	446	246	70	8	406	526	18	77
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	263	322	26	123	485	267	76	9	441	572	20	84
Lane Group Flow (vph)	263	322	26	123	485	267	76	9	441	572	20	84
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	14.0	23.5	23.5	12.9	22.4	22.4	13.8	20.6	20.6	23.0	29.8	29.8
Total Split (%)	17.5%	29.4%	29.4%	16.1%	28.0%	28.0%	17.3%	25.8%	25.8%	28.8%	37.3%	37.3%
Maximum Green (s)	9.4	18.9	18.9	8.3	17.8	17.8	9.2	16.0	16.0	18.4	25.2	25.2
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	11.4	27.8	27.8	8.9	25.3	25.3	8.7	8.1	8.1	19.2	20.6	20.6
Actuated g/C Ratio	0.14	0.35	0.35	0.11	0.32	0.32	0.11	0.10	0.10	0.24	0.26	0.26
v/c Ratio	0.58	0.28	0.05	0.65	0.45	0.40	0.43	0.05	0.68	0.72	0.04	0.18
Control Delay	37.6	21.3	9.5	42.7	17.6	7.2	40.9	31.0	9.1	15.9	7.2	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	37.6	21.3	9.5	42.7	17.6	7.3	40.9	31.0	9.1	16.0	7.2	2.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	B	A	D	C	A	B	A	A
Approach Delay		27.8			18.0			14.1			14.1	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	62	58	0	63	114	41	36	4	0	141	5	15
Queue Length 95th (ft)	#104	108	19	m#119	174	m115	77	16	42	125	m3	m0
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	462	1142	528	189	1079	665	197	352	876	850	584	553
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	20	0	0
Spillback Cap Reductn	0	0	0	0	0	23	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.28	0.05	0.65	0.45	0.42	0.39	0.03	0.50	0.69	0.03	0.15

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 8 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 18.5 Intersection LOS: B
Intersection Capacity Utilization 50.9% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	2		1	1		1	1		2	2		1
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
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3273	3374	1509	1703	3406	1524	1687	1776	2656	3273	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3273	3374	1509	1703	3406	1524	1687	1776	2656	3273	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15			283			438			70
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	420	409	14	138	652	260	149	23	466	1012	12	64
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	457	445	15	150	709	283	162	25	507	1100	13	70
Lane Group Flow (vph)	457	445	15	150	709	283	162	25	507	1100	13	70
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	18.0	27.1	27.1	16.3	25.4	25.4	22.1	20.6	20.6	36.0	34.5	34.5
Total Split (%)	18.0%	27.1%	27.1%	16.3%	25.4%	25.4%	22.1%	20.6%	20.6%	36.0%	34.5%	34.5%
Maximum Green (s)	13.4	22.5	22.5	11.7	20.8	20.8	17.5	16.0	16.0	31.4	29.9	29.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	14.0	23.1	23.1	12.3	21.4	21.4	41.2	10.2	10.2	38.4	7.4	7.4
Actuated g/C Ratio	0.14	0.23	0.23	0.12	0.21	0.21	0.41	0.10	0.10	0.38	0.07	0.07
v/c Ratio	1.00	0.57	0.04	0.72	0.97	0.52	0.23	0.14	0.76	0.88	0.10	0.40
Control Delay	85.7	37.4	14.2	54.9	53.8	6.4	20.8	40.0	15.2	24.4	57.6	34.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	85.7	37.4	14.2	54.9	53.8	6.4	20.8	40.0	15.2	25.8	57.6	34.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D	B	D	D	A	C	D	B	C	E	C
Approach Delay		61.1			42.2			17.4			26.7	
Approach LOS		E			D			B			C	
Queue Length 50th (ft)	152	132	0	99	244	31	65	15	23	164	9	17
Queue Length 95th (ft)	#255	184	17	m#184	#364	61	120	37	75	#504	m14	m39
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	458	779	360	209	729	549	696	295	806	1256	542	509
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	53	0	0
Spillback Cap Reductn	0	0	0	0	0	6	0	40	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.57	0.04	0.72	0.97	0.52	0.23	0.10	0.63	0.91	0.02	0.14

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 74 (74%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 37.6 Intersection LOS: D
Intersection Capacity Utilization 75.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

ø2	ø1	ø4	ø3
20.6 s	36 s	27.1 s	16.3 s
ø6	ø5	ø8	ø7
34.5 s	22.1 s	25.4 s	18 s

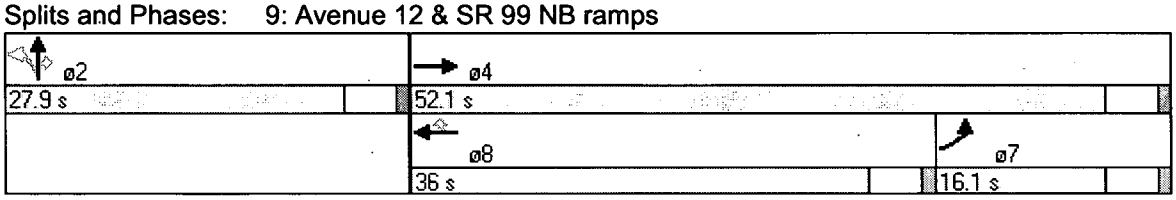
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		2	0		2	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	3505	0	0	3471	2733	0	1618	2538	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	3505	0	0	3471	2733	0	1618	2538	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						1234			113			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	106	1122	0	0	559	1086	245	11	409	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	120	1275	0	0	635	1234	278	12	465	0	0	0
Lane Group Flow (vph)	120	1275	0	0	635	1234	0	290	465	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	16.1	52.1	0.0	0.0	36.0	36.0	27.9	27.9	27.9	0.0	0.0	0.0
Total Split (%)	20.1%	65.1%	0.0%	0.0%	45.0%	45.0%	34.9%	34.9%	34.9%	0.0%	0.0%	0.0%
Maximum Green (s)	11.5	47.5			31.4	31.4	23.3	23.3	23.3			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	11.1	52.5			39.6	39.6		19.5	19.5			
Actuated g/C Ratio	0.14	0.66			0.50	0.50		0.24	0.24			
v/c Ratio	0.49	0.55			0.37	0.62		0.73	0.66			
Control Delay	32.2	4.2			15.4	2.7		38.8	24.5			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	32.2	4.2			15.4	2.7		38.8	24.5			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		D	C			
Approach Delay		6.6			7.0			30.0				
Approach LOS		A			A			C				
Queue Length 50th (ft)	60	47			108	0		133	88			
Queue Length 95th (ft)	m84	91			160	34		198	128			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	265	2299			1718	1976		483	837			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.45	0.55			0.37	0.62		0.60	0.56			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 58 (73%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 68.0% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



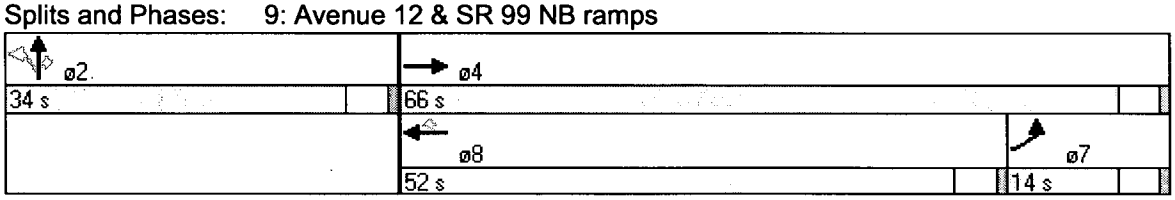
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		2	0		2	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	3438	0	0	3438	2707	0	1661	2608	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	3438	0	0	3438	2707	0	1661	2608	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						1508			23			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	126	1759	0	0	759	1578	292	3	658	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	143	1999	0	0	862	1793	332	3	748	0	0	0
Lane Group Flow (vph)	143	1999	0	0	862	1793	0	335	748	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	14.0	66.0	0.0	0.0	52.0	52.0	34.0	34.0	34.0	0.0	0.0	0.0
Total Split (%)	14.0%	66.0%	0.0%	0.0%	52.0%	52.0%	34.0%	34.0%	34.0%	0.0%	0.0%	0.0%
Maximum Green (s)	9.4	61.4			47.4	47.4	29.4	29.4	29.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	10.0	62.3			48.3	48.3		29.7	29.7			
Actuated g/C Ratio	0.10	0.62			0.48	0.48		0.30	0.30			
v/c Ratio	0.83	0.93			0.52	0.86		0.68	0.94			
Control Delay	61.4	14.7			19.3	8.6		38.9	55.1			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	61.4	14.7			19.3	8.6		38.9	55.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	B			B	A		D	E			
Approach Delay		17.9			12.1			50.1				
Approach LOS		B			B			D				
Queue Length 50th (ft)	92	523			193	57		186	255			
Queue Length 95th (ft)	m#133	#605			242	157		278	#371			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	172	2141			1659	2087		498	799			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.83	0.93			0.52	0.86		0.67	0.94			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 46 (46%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 88.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



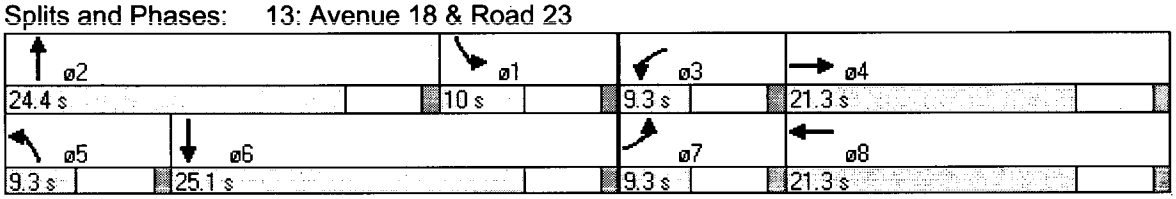
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.909			0.900			0.999			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1693	0	1770	1676	0	1770	1861	0	1770	1852	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1693	0	1770	1676	0	1770	1861	0	1770	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			42						4	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		41.0			42.4			36.1			35.9	
Volume (vph)	15	8	13	2	19	39	18	300	2	76	289	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	9	14	2	21	42	20	326	2	83	314	14
Lane Group Flow (vph)	16	23	0	2	63	0	20	328	0	83	328	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	24.4	0.0	10.0	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	37.5%	0.0%	15.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.1		4.7	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.9	9.2		5.9	9.2		5.9	41.8		6.9	47.6	
Actuated g/C Ratio	0.08	0.13		0.08	0.13		0.08	0.65		0.10	0.74	
v/c Ratio	0.11	0.10		0.01	0.24		0.14	0.27		0.46	0.24	
Control Delay	25.5	13.5		24.0	12.0		25.8	9.5		28.8	6.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.5	13.5		24.0	12.0		25.8	9.5		28.8	6.7	
LOS	C	B		C	B		C	A		C	A	
Approach Delay		18.4			12.3			10.4			11.1	
Approach LOS		B			B			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	4	2		1	5		5	53		20	25	
Queue Length 95th (ft)	20	19		6	33		24	152		64	148	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	145	431		145	448		145	1205		179	1365	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.05		0.01	0.14		0.14	0.27		0.46	0.24	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 64.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 11.3 Intersection LOS: B
Intersection Capacity Utilization 37.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 13: Avenue 18 & Road 23



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.932			0.865			0.999			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1736	0	1770	1611	0	1770	1861	0	1770	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1736	0	1770	1611	0	1770	1861	0	1770	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			117			1			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		41.0			42.4			36.1			35.9	
Volume (vph)	12	11	9	2	12	108	25	444	4	99	457	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	12	10	2	13	117	27	483	4	108	497	11
Lane Group Flow (vph)	13	22	0	2	130	0	27	487	0	108	508	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	24.4	0.0	10.0	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	37.5%	0.0%	15.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.1		4.7	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.7	9.2		5.7	9.2		5.7	32.3		6.7	40.2	
Actuated g/C Ratio	0.08	0.15		0.08	0.15		0.08	0.54		0.11	0.67	
v/c Ratio	0.09	0.08		0.01	0.38		0.18	0.49		0.56	0.41	
Control Delay	25.4	14.8		24.5	9.1		27.1	14.0		34.6	9.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.4	14.8		24.5	9.1		27.1	14.0		34.6	9.6	
LOS	C	B		C	A		C	B		C	A	
Approach Delay		18.7			9.3			14.7			14.0	
Approach LOS		B			A			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	3	3		1	3		7	87		27	44	
Queue Length 95th (ft)	18	19		6	41		30	#287		#98	#297	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	150	470		150	515		150	1002		192	1245	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.05		0.01	0.25		0.18	0.49		0.56	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 60
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 13.9 Intersection LOS: B
Intersection Capacity Utilization 46.4% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Avenue 18 & Road 23

ø1	ø2	ø3	ø4
10 s	24.4 s	9.3 s	21.3 s
ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

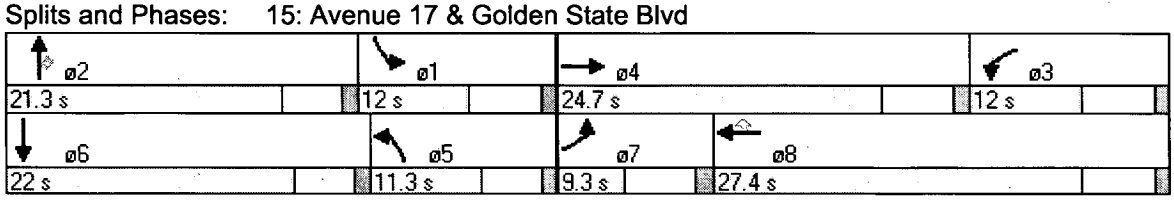
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	1.00	1.00	0.88	0.94	1.00	1.00
Frt		0.990				0.850			0.850		0.919	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	5034	0	3367	4988	1553	1492	1570	2349	4990	1712	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	5034	0	3367	4988	1553	1492	1570	2349	4990	1712	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				605			285		20	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	41	841	62	231	998	557	49	40	262	354	16	18
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	45	914	67	251	1085	605	53	43	285	385	17	20
Lane Group Flow (vph)	45	981	0	251	1085	605	53	43	285	385	37	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3	21.3	9.3	21.3	
Total Split (s)	9.3	24.7	0.0	12.0	27.4	27.4	11.3	21.3	21.3	12.0	22.0	0.0
Total Split (%)	13.3%	35.3%	0.0%	17.1%	39.1%	39.1%	16.1%	30.4%	30.4%	17.1%	31.4%	0.0%
Maximum Green (s)	4.0	19.4		6.7	22.1	22.1	6.7	16.7	16.7	6.7	17.4	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6	3.6	4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max	Max	None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	5.3	20.7		8.0	27.1	27.1	6.9	17.3	17.3	8.0	22.5	
Actuated g/C Ratio	0.08	0.30		0.11	0.39	0.39	0.10	0.25	0.25	0.11	0.32	
v/c Ratio	0.34	0.65		0.65	0.56	0.62	0.36	0.11	0.36	0.68	0.07	
Control Delay	37.9	23.6		29.1	11.6	5.2	36.5	21.4	4.5	36.3	12.9	
Queue Delay	0.0	0.0		0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.9	23.6		29.1	11.6	5.6	36.5	21.4	4.5	36.3	12.9	
LOS	D	C		C	B	A	D	C	A	D	B	
Approach Delay		24.2			12.0			10.9			34.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	19	131		51	107	61	22	14	0	57	6	
Queue Length 95th (ft)	49	173		m#86	127	14	54	38	29	86	26	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	134	1501		385	1932	972	156	388	795	570	564	
Starvation Cap Reductn	0	0		0	0	79	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.34	0.65		0.65	0.56	0.68	0.34	0.11	0.36	0.68	0.07	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 17.7 Intersection LOS: B
Intersection Capacity Utilization 51.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	1.00	1.00	0.88	0.94	1.00	1.00
Frt		0.994				0.850			0.850		0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	5055	0	3213	4759	1482	1736	1827	2733	4990	1703	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	5055	0	3213	4759	1482	1736	1827	2733	4990	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				839			349		53	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	60	1598	71	334	1507	818	110	54	476	884	36	49
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	65	1737	77	363	1638	889	120	59	517	961	39	53
Lane Group Flow (vph)	65	1814	0	363	1638	889	120	59	517	961	92	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3	21.3	9.3	21.3	
Total Split (s)	10.4	39.7	0.0	15.7	45.0	45.0	17.6	21.3	21.3	23.3	27.0	0.0
Total Split (%)	10.4%	39.7%	0.0%	15.7%	45.0%	45.0%	17.6%	21.3%	21.3%	23.3%	27.0%	0.0%
Maximum Green (s)	5.1	34.4		10.4	39.7	39.7	13.0	16.7	16.7	18.0	22.4	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6	3.6	4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max	Max	None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	6.4	35.7		11.7	43.1	43.1	11.7	17.3	17.3	19.3	24.9	
Actuated g/C Ratio	0.06	0.36		0.12	0.43	0.43	0.12	0.17	0.17	0.19	0.25	
v/c Ratio	0.58	1.00		0.97	0.80	0.80	0.59	0.19	0.68	1.00	0.20	
Control Delay	66.2	54.5		61.9	18.9	8.4	53.6	37.2	17.4	69.7	16.5	
Queue Delay	0.0	5.5		0.0	0.4	5.8	0.0	0.0	0.1	25.0	0.0	
Total Delay	66.2	60.0		61.9	19.3	14.2	53.6	37.2	17.5	94.7	16.5	
LOS	E	E		E	B	B	D	D	B	F	B	
Approach Delay		60.2			23.1			25.4			87.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		E			C			C			F	
Queue Length 50th (ft)	41	~419		117	298	163	73	32	53	219	19	
Queue Length 95th (ft)	#99	#541		m#159	m356	m419	130	70	116	#311	61	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	113	1809		376	2050	1116	236	316	761	963	464	
Starvation Cap Reductn	0	0		0	105	176	0	0	0	0	0	
Spillback Cap Reductn	0	34		0	0	0	0	0	11	68	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.58	1.02		0.97	0.84	0.95	0.51	0.19	0.69	1.07	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 44.5 Intersection LOS: D
Intersection Capacity Utilization 75.9% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd

ø2	ø1	ø4	ø3
21.3 s	23.3 s	39.7 s	15.7 s

ø5	ø6	ø7	ø8
17.6 s	27 s	10.4 s	45 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.855			0.997			0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1674	0	1626	1464	0	1504	1579	0	1570	1636	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1674	0	1626	1464	0	1504	1579	0	1570	1636	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			30			2			6	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	1	1	1	32	1	28	1	379	8	1	344	24
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	1	1	1	35	1	30	1	412	9	1	374	26
Lane Group Flow (vph)	1	2	0	35	31	0	1	421	0	1	400	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	25.1	0.0	9.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	38.6%	0.0%	14.3%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.8		4.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.4	8.3		6.9	9.0		6.4	67.6		6.4	67.6	
Actuated g/C Ratio	0.08	0.10		0.08	0.10		0.08	0.87		0.08	0.87	
v/c Ratio	0.01	0.01		0.26	0.17		0.01	0.30		0.01	0.28	
Control Delay	19.0	16.0		22.1	10.1		19.0	6.4		19.0	5.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.0	16.0		22.1	10.1		19.0	6.4		19.0	5.5	
LOS	B	B		C	B		B	A		B	A	
Approach Delay		17.0			16.5			6.4			5.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			A			A	
Queue Length 50th (ft)	0	0		11	0		0	0		0	0	
Queue Length 95th (ft)	4	6		33	19		4	#239		4	190	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	129	348		133	330		114	1381		118	1432	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.26	0.09		0.01	0.30		0.01	0.28	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 77.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 6.8 Intersection LOS: A
Intersection Capacity Utilization 35.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Avenue 15 1/2 & Road 23

ø1	ø2	ø4	ø3
9.3 s	25.1 s	21.3 s	9.3 s

ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.858			0.991			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1627	0	1736	1567	0	1703	1776	0	1556	1594	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1627	0	1736	1567	0	1703	1776	0	1556	1594	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			53			5			18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	1	2	2	38	3	49	2	536	33	5	505	111
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	1	2	2	41	3	53	2	583	36	5	549	121
Lane Group Flow (vph)	1	4	0	41	56	0	2	619	0	5	670	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	40.1	0.0	9.3	40.1	0.0
Total Split (%)	11.6%	26.6%	0.0%	11.6%	26.6%	0.0%	11.6%	50.1%	0.0%	11.6%	50.1%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	34.8		4.0	34.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.7	7.7		7.2	8.6		5.7	62.2		5.7	62.2	
Actuated g/C Ratio	0.07	0.09		0.09	0.10		0.07	0.79		0.07	0.79	
v/c Ratio	0.01	0.03		0.28	0.27		0.02	0.44		0.05	0.53	
Control Delay	29.0	23.5		30.1	12.0		29.5	7.1		30.0	9.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.0	23.5		30.1	12.0		29.5	7.1		30.0	9.2	
LOS	C	C		C	B		C	A		C	A	
Approach Delay		24.6			19.7			7.1			9.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			A			A	
Queue Length 50th (ft)	0	1		14	1		1	58		2	69	
Queue Length 95th (ft)	5	9		45	32		7	319		12	#449	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	110	316		148	361		112	1406		103	1265	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.28	0.16		0.02	0.44		0.05	0.53	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 78.6
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 9.1 Intersection LOS: A
Intersection Capacity Utilization 48.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Avenue 15 1/2 & Road 23

ø1	ø2	ø4	ø3
9.3 s	40.1 s	21.3 s	9.3 s
ø5	ø6	ø8	ø7
9.3 s	40.1 s	21.3 s	9.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		1	1		2	2		0
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
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00
Frt		0.960				0.850			0.850		0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3398	0	3433	3539	1583	1752	3505	2760	2575	1302	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3398	0	3433	3539	1583	1752	3505	2760	2575	1302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		70				445			471		58	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	165	378	136	392	306	409	108	152	433	269	106	88
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	36%	36%	36%
Adj. Flow (vph)	179	411	148	426	333	445	117	165	471	292	115	96
Lane Group Flow (vph)	179	559	0	426	333	445	117	165	471	292	211	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9	20.9	8.9	20.9	20.9	8.9	20.9	
Total Split (s)	12.1	22.1	0.0	14.0	24.0	24.0	11.4	20.9	20.9	13.0	22.5	0.0
Total Split (%)	17.3%	31.6%	0.0%	20.0%	34.3%	34.3%	16.3%	29.9%	29.9%	18.6%	32.1%	0.0%
Maximum Green (s)	7.2	17.2		9.1	19.1	19.1	6.5	16.0	16.0	8.1	17.6	
Yellow Time (s)	3.9	3.9		3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	8.1	19.9		12.6	24.4	24.4	7.3	12.5	12.5	9.0	16.4	
Actuated g/C Ratio	0.12	0.28		0.18	0.35	0.35	0.10	0.18	0.18	0.13	0.23	
v/c Ratio	0.87	0.55		0.69	0.27	0.53	0.64	0.26	0.54	0.88	0.60	
Control Delay	71.2	21.5		27.9	12.9	5.4	47.9	24.6	5.0	59.8	25.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	71.2	21.5		27.9	12.9	5.4	47.9	24.6	5.0	59.8	25.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	C		C	B	A	D	C	A	E	C	
Approach Delay		33.5			15.4			15.9			45.4	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	77	96		75	53	26	49	32	0	64	60	
Queue Length 95th (ft)	#184	145		#160	63	19	#118	53	36	#131	120	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	205	1017		617	1234	842	185	846	1024	331	393	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.87	0.55		0.69	0.27	0.53	0.63	0.20	0.46	0.88	0.54	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 47 (67%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 24.4 Intersection LOS: C
Intersection Capacity Utilization 56.3% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 20: Ellis Ave & Golden State Blvd

ø1	ø2	ø3	ø4
13 s	20.9 s	14 s	22.1 s

ø5	ø6	ø8	ø7
11.4 s	22.5 s	24 s	12.1 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		1	1		2	2		0
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
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00
Frt		0.958				0.850			0.850		0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	3433	3539	1583	1597	3195	2515	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	3433	3539	1583	1597	3195	2515	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61				447			884		32	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	202	583	227	845	498	571	191	254	919	407	184	120
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	220	634	247	918	541	621	208	276	999	442	200	130
Lane Group Flow (vph)	220	881	0	918	541	621	208	276	999	442	330	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9	20.9	8.9	20.9	20.9	8.9	20.9	
Total Split (s)	19.1	26.6	0.0	27.0	34.5	34.5	15.5	21.0	21.0	15.4	20.9	0.0
Total Split (%)	21.2%	29.6%	0.0%	30.0%	38.3%	38.3%	17.2%	23.3%	23.3%	17.1%	23.2%	0.0%
Maximum Green (s)	14.2	21.7		22.1	29.6	29.6	10.6	16.1	16.1	10.5	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	14.4	22.6		23.0	31.2	31.2	11.5	15.6	15.6	12.8	16.9	
Actuated g/C Ratio	0.16	0.25		0.26	0.35	0.35	0.13	0.17	0.17	0.14	0.19	
v/c Ratio	0.78	0.98		1.05	0.44	0.74	1.02	0.50	0.86	0.91	0.93	
Control Delay	55.9	58.5		63.8	14.8	10.1	109.7	36.7	13.5	63.3	67.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	55.9	58.5		63.8	14.8	10.1	109.7	36.7	13.5	63.3	67.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	E		E	B	B	F	D	B	E	E	
Approach Delay		58.0			35.0			31.3			65.0	
Approach LOS		E			D			C			E	
Queue Length 50th (ft)	120	246		~293	94	64	~123	74	31	~134	170	
Queue Length 95th (ft)	#225	#378		m#371	m121	m90	#263	113	#119	#232	#333	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	297	897		877	1227	841	204	604	1192	488	355	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.74	0.98		1.05	0.44	0.74	1.02	0.46	0.84	0.91	0.93	

Intersection Summary

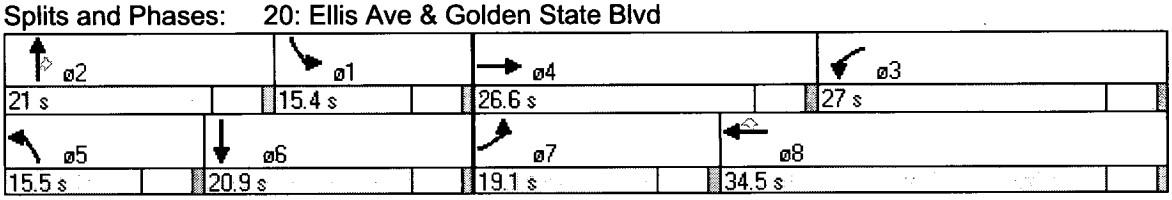
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 28 (31%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 42.9 Intersection LOS: D
Intersection Capacity Utilization 88.4% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



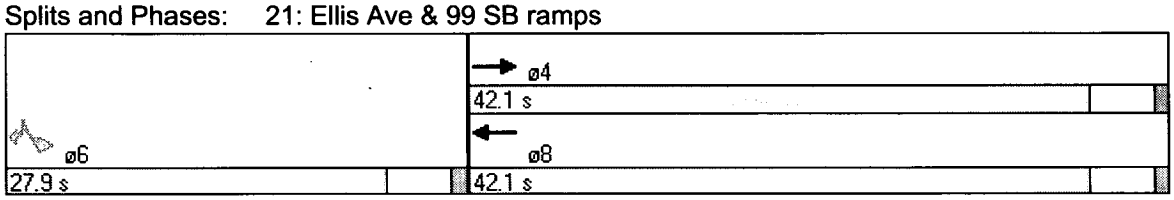
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	2		2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3505	0	0	3167	0	0	0	0	3303	0	2682
Flt Permitted										0.950		
Satd. Flow (perm)	0	3505	0	0	3167	0	0	0	0	3303	0	2682
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												330
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1076	0	0	673	0	0	0	0	353	0	433
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
Heavy Vehicles (%)	3%	3%	3%	14%	14%	14%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	1170	0	0	732	0	0	0	0	384	0	471
Lane Group Flow (vph)	0	1170	0	0	732	0	0	0	0	384	0	471
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	42.1	0.0	0.0	42.1	0.0	0.0	0.0	0.0	27.9	0.0	27.9
Total Split (%)	0.0%	60.1%	0.0%	0.0%	60.1%	0.0%	0.0%	0.0%	0.0%	39.9%	0.0%	39.9%
Maximum Green (s)		37.2			37.2					23.0		23.0
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		46.8			46.8					15.2		15.2
Actuated g/C Ratio		0.67			0.67					0.22		0.22
v/c Ratio		0.50			0.35					0.53		0.56
Control Delay		3.1			4.1					26.4		9.7
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		3.1			4.1					26.4		9.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			A					C		A
Approach Delay		3.1			4.1							
Approach LOS		A			A							
Queue Length 50th (ft)		38			0					75		28
Queue Length 95th (ft)		m48			137					103		63
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2342			2116					1128		1133
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.50			0.35					0.34		0.42

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 5 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 7.7 Intersection LOS: A
Intersection Capacity Utilization 60.5% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



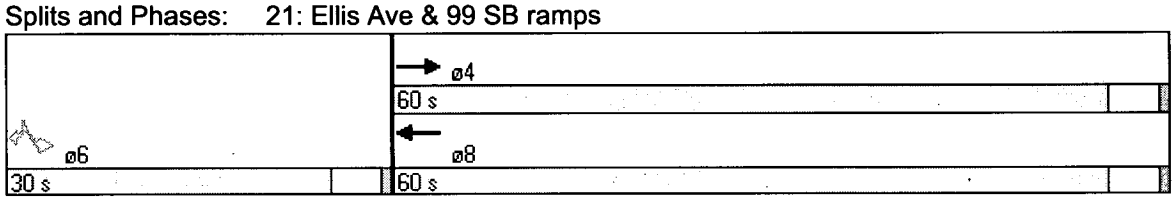
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	2		2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	3367	0	2733
Flt Permitted										0.950		
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	3367	0	2733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												146
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1909	0	0	1108	0	0	0	0	573	0	806
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	2075	0	0	1204	0	0	0	0	623	0	876
Lane Group Flow (vph)	0	2075	0	0	1204	0	0	0	0	623	0	876
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	60.0	0.0	0.0	60.0	0.0	0.0	0.0	0.0	30.0	0.0	30.0
Total Split (%)	0.0%	66.7%	0.0%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	33.3%
Maximum Green (s)		55.1			55.1					25.1		25.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		55.5			55.5					26.5		26.5
Actuated g/C Ratio		0.62			0.62					0.29		0.29
v/c Ratio		0.95			0.55					0.63		0.97
Control Delay		11.9			6.2					31.0		50.2
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		11.9			6.2					31.0		50.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B			A					C		D
Approach Delay		11.9			6.2							
Approach LOS		B			A							
Queue Length 50th (ft)		176			200					158		240
Queue Length 95th (ft)		m#238			m225					215		#386
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2202			2202					992		907
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.94			0.55					0.63		0.97

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 20.0 Intersection LOS: B
Intersection Capacity Utilization 92.0% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



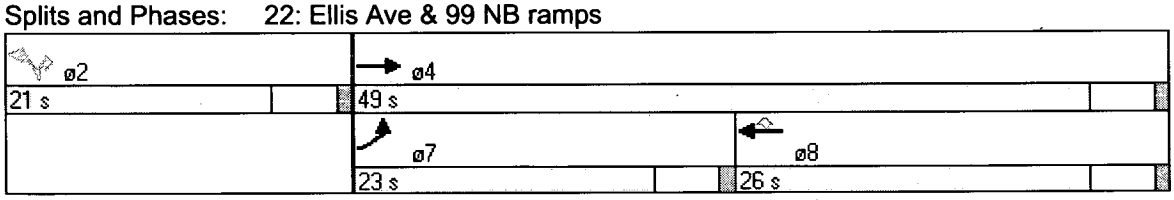
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3367	3471	0	0	3312	1482	3273	0	1509	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3367	3471	0	0	3312	1482	3273	0	1509	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						412			322			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	545	519	0	0	544	379	402	0	296	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	9%	9%	9%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	592	564	0	0	591	412	437	0	322	0	0	0
Lane Group Flow (vph)	592	564	0	0	591	412	437	0	322	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9	20.9	20.9		20.9			
Total Split (s)	23.0	49.0	0.0	0.0	26.0	26.0	21.0	0.0	21.0	0.0	0.0	0.0
Total Split (%)	32.9%	70.0%	0.0%	0.0%	37.1%	37.1%	30.0%	0.0%	30.0%	0.0%	0.0%	0.0%
Maximum Green (s)	18.1	44.1			21.1	21.1	16.1		16.1			
Yellow Time (s)	3.9	3.9			3.9	3.9	3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Min			C-Min	C-Min	None		None			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	18.0	46.9			24.9	24.9	15.1		15.1			
Actuated g/C Ratio	0.26	0.67			0.36	0.36	0.22		0.22			
v/c Ratio	0.68	0.24			0.50	0.52	0.62		0.56			
Control Delay	26.4	4.0			20.6	4.9	28.7		7.1			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	26.4	4.0			20.6	4.9	28.7		7.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C	A	C		A			
Approach Delay		15.5			14.1							
Approach LOS		B			B							
Queue Length 50th (ft)	101	35			112	0	86		0			
Queue Length 95th (ft)	142	47			159	58	127		58			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	932	2325			1188	796	795		610			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.64	0.24			0.50	0.52	0.55		0.53			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 40 (57%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 16.1 Intersection LOS: B
Intersection Capacity Utilization 60.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 22: Ellis Ave & 99 NB ramps



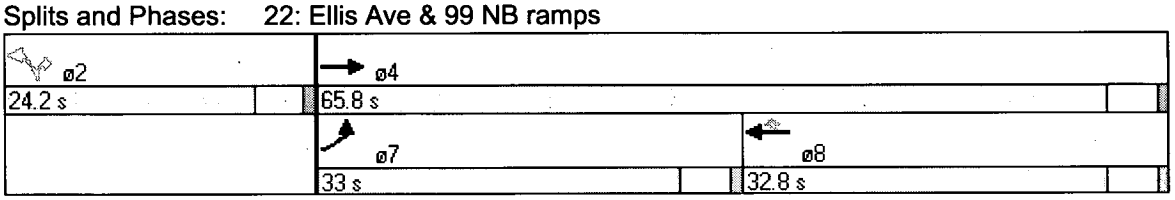
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3505	1568	3433	0	1583	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3505	1568	3433	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						451			190			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	982	842	0	0	978	589	614	0	455	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1067	915	0	0	1063	640	667	0	495	0	0	0
Lane Group Flow (vph)	1067	915	0	0	1063	640	667	0	495	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9	20.9	20.9		20.9			
Total Split (s)	33.0	65.8	0.0	0.0	32.8	32.8	24.2	0.0	24.2	0.0	0.0	0.0
Total Split (%)	36.7%	73.1%	0.0%	0.0%	36.4%	36.4%	26.9%	0.0%	26.9%	0.0%	0.0%	0.0%
Maximum Green (s)	28.1	60.9			27.9	27.9	19.3		19.3			
Yellow Time (s)	3.9	3.9			3.9	3.9	3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Min			C-Min	C-Min	None		None			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	29.0	61.8			28.8	28.8	20.2		20.2			
Actuated g/C Ratio	0.32	0.69			0.32	0.32	0.22		0.22			
v/c Ratio	0.96	0.38			0.95	0.79	0.87		0.98			
Control Delay	40.6	3.5			47.8	16.5	46.9		59.8			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	40.6	3.5			47.8	16.5	46.9		59.8			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			D	B	D		E			
Approach Delay		23.5			36.1							
Approach LOS		C			D							
Queue Length 50th (ft)	289	57			307	91	189		185			
Queue Length 95th (ft)	m#367	m84			#441	#256	#281		#392			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	1106	2430			1122	808	771		503			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.96	0.38			0.95	0.79	0.87		0.98			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 61 (68%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 34.8 Intersection LOS: C
Intersection Capacity Utilization 92.0% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



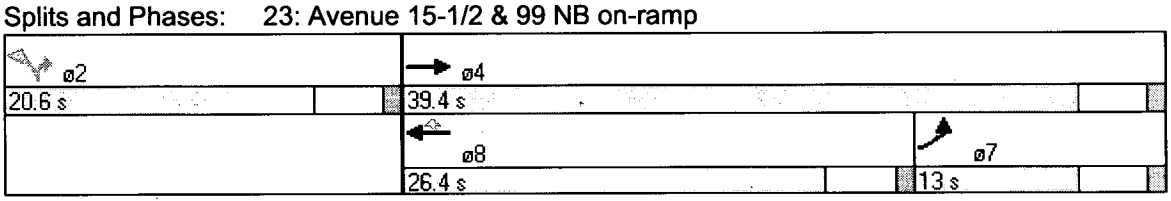
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		3	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	0.76	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	5085	0	0	4988	1553	3242	0	3409	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	5085	0	0	4988	1553	3242	0	3409	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						526			241			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	292	957	0	0	1299	484	386	0	468	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	317	1040	0	0	1412	526	420	0	509	0	0	0
Lane Group Flow (vph)	317	1040	0	0	1412	526	420	0	509	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	13.0	39.4	0.0	0.0	26.4	26.4	20.6	0.0	20.6	0.0	0.0	0.0
Total Split (%)	21.7%	65.7%	0.0%	0.0%	44.0%	44.0%	34.3%	0.0%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	34.8			21.8	21.8	16.0		16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	9.0	37.9			24.9	24.9	14.1		14.1			
Actuated g/C Ratio	0.15	0.63			0.42	0.42	0.24		0.24			
v/c Ratio	0.62	0.32			0.68	0.55	0.55		0.52			
Control Delay	31.6	3.9			17.0	4.1	22.6		11.7			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	31.6	3.9			17.0	4.1	22.6		11.7			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A	C		B			
Approach Delay		10.4			13.5							
Approach LOS		B			B							
Queue Length 50th (ft)	68	45			150	0	67		34			
Queue Length 95th (ft)	105	57			207	53	101		62			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	515	3212			2070	952	897		1117			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.62	0.32			0.68	0.55	0.47		0.46			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 62.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



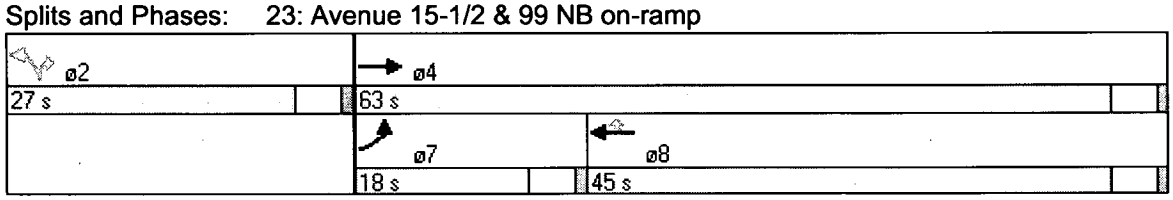
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		3	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	0.76	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	5085	0	0	5085	1583	3400	0	3575	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	5085	0	0	5085	1583	3400	0	3575	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						687			18			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	473	2153	0	0	2072	807	794	0	810	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	514	2340	0	0	2252	877	863	0	880	0	0	0
Lane Group Flow (vph)	514	2340	0	0	2252	877	863	0	880	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	18.0	63.0	0.0	0.0	45.0	45.0	27.0	0.0	27.0	0.0	0.0	0.0
Total Split (%)	20.0%	70.0%	0.0%	0.0%	50.0%	50.0%	30.0%	0.0%	30.0%	0.0%	0.0%	0.0%
Maximum Green (s)	13.4	58.4			40.4	40.4	22.4		22.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	14.0	59.0			41.0	41.0	23.0		23.0			
Actuated g/C Ratio	0.16	0.66			0.46	0.46	0.26		0.26			
v/c Ratio	0.96	0.70			0.97	0.80	0.99		0.95			
Control Delay	61.7	2.4			38.0	11.1	63.7		53.0			
Queue Delay	0.0	0.4			0.0	0.0	0.0		0.0			
Total Delay	61.7	2.8			38.0	11.1	63.7		53.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			D	B	E		D			
Approach Delay		13.4			30.4							
Approach LOS		B			C							
Queue Length 50th (ft)	153	77			442	65	252		212			
Queue Length 95th (ft)	m#176	m77			#574	262	#380		#315			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	534	3334			2317	1095	869		927			
Starvation Cap Reductn	0	463			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.96	0.82			0.97	0.80	0.99		0.95			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 97.3% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



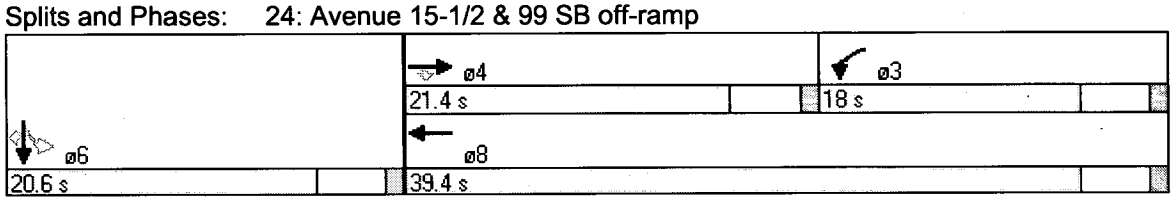
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	5085	1583	3367	4988	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	5085	1583	3367	4988	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			475									64
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	882	437	535	1150	0	0	0	0	367	1	236
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	959	475	582	1250	0	0	0	0	399	1	257
Lane Group Flow (vph)	0	959	475	582	1250	0	0	0	0	200	200	257
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	21.4	21.4	18.0	39.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	35.7%	35.7%	30.0%	65.7%	0.0%	0.0%	0.0%	0.0%	34.3%	34.3%	34.3%
Maximum Green (s)		16.8	16.8	13.4	34.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		20.9	20.9	14.0	38.9					13.1	13.1	13.1
Actuated g/C Ratio		0.35	0.35	0.23	0.65					0.22	0.22	0.22
v/c Ratio		0.54	0.55	0.74	0.39					0.54	0.54	0.65
Control Delay		17.9	4.9	17.9	1.0					25.8	25.7	23.3
Queue Delay		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Total Delay		17.9	4.9	17.9	1.0					25.8	25.7	23.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B	A	B	A					C	C	C
Approach Delay		13.6			6.4						24.8	
Approach LOS		B			A						C	
Queue Length 50th (ft)		101	0	107	0					66	66	62
Queue Length 95th (ft)		149	59	#130	19					117	117	120
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1771	861	786	3234					465	466	484
Starvation Cap Reductn		0	0	0	0					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.54	0.55	0.74	0.39					0.43	0.43	0.53

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 12.1 Intersection LOS: B
Intersection Capacity Utilization 62.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



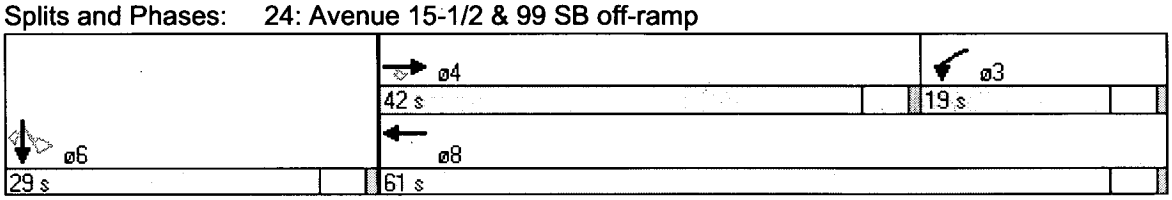
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.952	
Satd. Flow (prot)	0	5085	1583	3433	5085	0	0	0	0	1681	1685	1583
Flt Permitted				0.950						0.950	0.952	
Satd. Flow (perm)	0	5085	1583	3433	5085	0	0	0	0	1681	1685	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			688									4
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1828	828	487	2379	0	0	0	0	798	1	392
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1987	900	529	2586	0	0	0	0	867	1	426
Lane Group Flow (vph)	0	1987	900	529	2586	0	0	0	0	434	434	426
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	42.0	42.0	19.0	61.0	0.0	0.0	0.0	0.0	29.0	29.0	29.0
Total Split (%)	0.0%	46.7%	46.7%	21.1%	67.8%	0.0%	0.0%	0.0%	0.0%	32.2%	32.2%	32.2%
Maximum Green (s)		37.4	37.4	14.4	56.4					24.4	24.4	24.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		38.0	38.0	15.0	57.0					25.0	25.0	25.0
Actuated g/C Ratio		0.42	0.42	0.17	0.63					0.28	0.28	0.28
v/c Ratio		0.93	0.84	0.92	0.80					0.93	0.93	0.96
Control Delay		33.6	14.4	38.5	7.4					60.8	60.4	68.0
Queue Delay		0.0	0.0	0.0	0.7					0.0	0.0	0.0
Total Delay		33.6	14.4	38.5	8.1					60.8	60.4	68.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	B	D	A					E	E	E
Approach Delay		27.6			13.3						63.0	
Approach LOS		C			B						E	
Queue Length 50th (ft)		382	91	145	164					252	251	237
Queue Length 95th (ft)		#495	#419	m145	m167					#443	#443	#427
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		2147	1066	572	3221					467	468	443
Starvation Cap Reductn		0	0	0	286					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.93	0.84	0.92	0.88					0.93	0.93	0.96

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 27.8 Intersection LOS: C
Intersection Capacity Utilization 97.3% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



Mitigated 2030 Project AM Alt A
25: 99 NB on-ramp & SR 145 / Madera Ave 9/12/2006

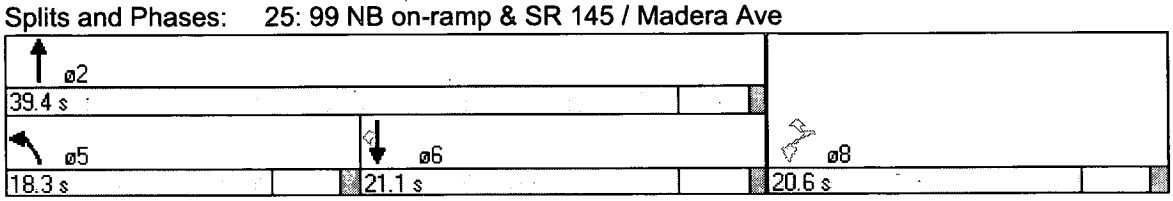
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.91	0.91
Frt						0.850					0.917	0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	3539	0	0	3109	1441
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	3539	0	0	3109	1441
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						53					358	358
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	678	0	49	698	759	0	0	268	659
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	737	0	53	759	825	0	0	291	716
Lane Group Flow (vph)	0	0	0	737	0	53	759	825	0	0	649	358
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	18.3	39.4	0.0	0.0	21.1	21.1
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	30.5%	65.7%	0.0%	0.0%	35.2%	35.2%
Maximum Green (s)				16.0		16.0	13.7	34.8			16.5	16.5
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				17.0		17.0	15.7	35.0			15.3	15.3
Actuated g/C Ratio				0.28		0.28	0.26	0.58			0.26	0.26
v/c Ratio				0.76		0.11	0.84	0.40			0.61	0.56
Control Delay				25.8		6.3	31.1	7.8			11.3	6.3
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				25.8		6.3	31.1	7.8			11.3	6.3
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								18.9			9.5	
Approach LOS								B			A	
Queue Length 50th (ft)				113		0	145	106			49	0
Queue Length 95th (ft)				#189		21	#243	135			90	58
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				1006		501	901	2122			1151	671
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.73		0.11	0.84	0.39			0.56	0.53

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 32 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 17.4 Intersection LOS: B
Intersection Capacity Utilization 63.7% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



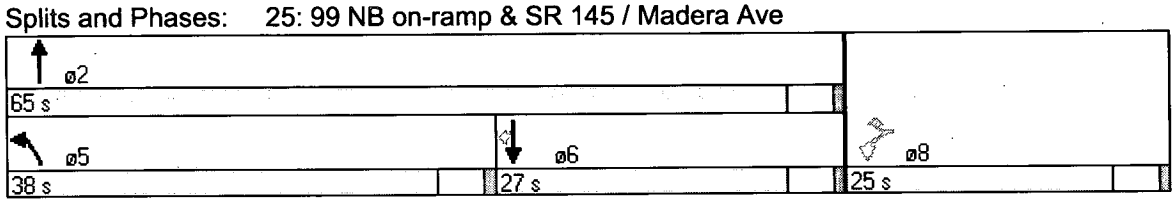
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.91	0.91
Frt						0.850					0.945	0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	3539	0	0	3204	1441
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	3539	0	0	3204	1441
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73					106	422
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	697	0	67	1123	1062	0	0	449	768
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	758	0	73	1221	1154	0	0	488	835
Lane Group Flow (vph)	0	0	0	758	0	73	1221	1154	0	0	768	555
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	25.0	0.0	25.0	38.0	65.0	0.0	0.0	27.0	27.0
Total Split (%)	0.0%	0.0%	0.0%	27.8%	0.0%	27.8%	42.2%	72.2%	0.0%	0.0%	30.0%	30.0%
Maximum Green (s)				20.4		20.4	33.4	60.4			22.4	22.4
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				21.2		21.2	34.2	60.8			22.6	22.6
Actuated g/C Ratio				0.24		0.24	0.38	0.68			0.25	0.25
v/c Ratio				0.94		0.17	0.94	0.48			0.87	0.82
Control Delay				54.4		8.2	24.5	2.4			39.7	19.4
Queue Delay				0.0		0.0	0.0	0.4			0.0	0.0
Total Delay				54.4		8.2	24.5	2.8			39.7	19.4
LOS				D		A	C	A			D	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								14.0			31.2	
Approach LOS								B			C	
Queue Length 50th (ft)				219		0	203	13			199	69
Queue Length 95th (ft)				#332		34	m#304	m14			#302	#282
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				810		429	1303	2399			898	682
Starvation Cap Reductn				0		0	0	645			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.94		0.17	0.94	0.66			0.86	0.81

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 5 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 25.7 Intersection LOS: C
Intersection Capacity Utilization 82.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



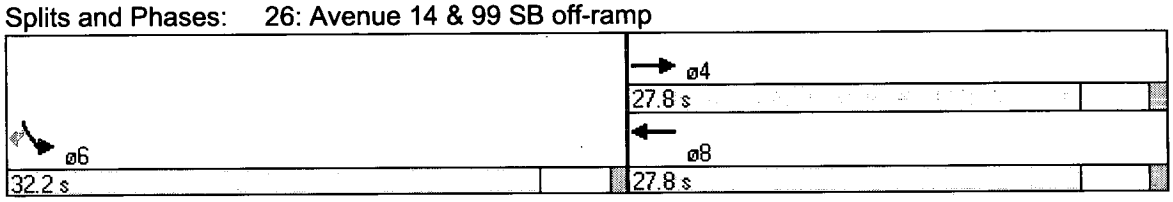
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	3539	0	3400	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	3400	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						79
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	793	719	0	809	371
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	862	782	0	879	403
Lane Group Flow (vph)	0	862	782	0	879	403
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	27.8	27.8	0.0	32.2	32.2
Total Split (%)	0.0%	46.3%	46.3%	0.0%	53.7%	53.7%
Maximum Green (s)		23.2	23.2		27.6	27.6
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		29.1	29.1		22.9	22.9
Actuated g/C Ratio		0.48	0.48		0.38	0.38
v/c Ratio		0.50	0.45		0.68	0.62
Control Delay		12.9	5.9		17.8	15.7
Queue Delay		0.0	0.8		0.0	0.0
Total Delay		12.9	6.7		17.8	15.7
LOS		B	A		B	B
Approach Delay		12.9	6.7		17.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		B	
Queue Length 50th (ft)		105	24		130	89
Queue Length 95th (ft)		178	81		156	143
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1719	1719		1598	779
Starvation Cap Reductn		0	596		0	0
Spillback Cap Reductn		50	0		11	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.52	0.70		0.55	0.52

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 8 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	3539	0	3433	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	3433	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						87
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	1118	778	0	1164	311
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1215	846	0	1265	338
Lane Group Flow (vph)	0	1215	846	0	1265	338
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	44.0	44.0	0.0	46.0	46.0
Total Split (%)	0.0%	48.9%	48.9%	0.0%	51.1%	51.1%
Maximum Green (s)		39.4	39.4		41.4	41.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		42.8	42.8		39.2	39.2
Actuated g/C Ratio		0.48	0.48		0.44	0.44
v/c Ratio		0.72	0.50		0.85	0.46
Control Delay		22.7	5.4		28.7	14.6
Queue Delay		1.5	1.0		0.1	0.0
Total Delay		24.2	6.4		28.9	14.6
LOS		C	A		C	B
Approach Delay		24.2	6.4		25.8	
Approach LOS		C	A		C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		297	60		301	88
Queue Length 95th (ft)		381	76		388	157
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1684	1684		1602	785
Starvation Cap Reductn		0	537		0	0
Spillback Cap Reductn		275	0		31	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.86	0.74		0.81	0.43

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 44 (49%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 20.8 Intersection LOS: C
Intersection Capacity Utilization 70.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp

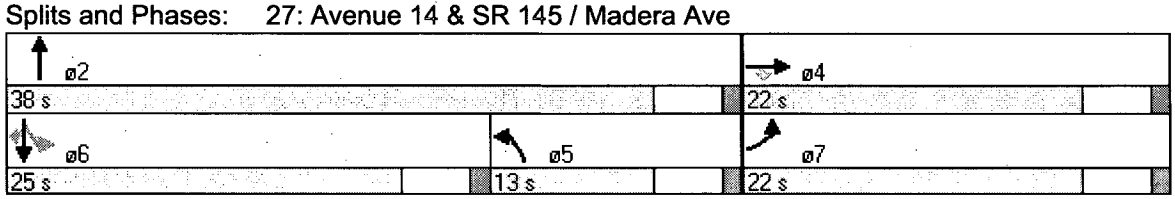
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		2	0		0	2		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50		50	50	50
Trailing Detector (ft)	0	0	0				0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	0.88	1.00	1.00	1.00	0.97	0.91	0.91	1.00	0.95	1.00
Frt			0.850					0.988				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3335	3438	2707	0	0	0	3400	4975	0	1752	3505	1568
Flt Permitted	0.950						0.950			0.190		
Satd. Flow (perm)	3335	3438	2707	0	0	0	3400	4975	0	350	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			748					37				458
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	384	363	855	0	0	0	298	1073	90	40	485	421
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	417	395	929	0	0	0	324	1166	98	43	527	458
Lane Group Flow (vph)	417	395	929	0	0	0	324	1264	0	43	527	458
Turn Type	Prot		Perm				Prot			Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4							6		6
Detector Phases	7	4	4				5	2		6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6		20.6	20.6	20.6
Total Split (s)	22.0	22.0	22.0	0.0	0.0	0.0	13.0	38.0	0.0	25.0	25.0	25.0
Total Split (%)	36.7%	36.7%	36.7%	0.0%	0.0%	0.0%	21.7%	63.3%	0.0%	41.7%	41.7%	41.7%
Maximum Green (s)	17.4	17.4	17.4				8.4	33.4		20.4	20.4	20.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0		1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min		C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0		0	0	0
Act Effct Green (s)	14.7	14.7	14.7				9.2	37.3		24.1	24.1	24.1
Actuated g/C Ratio	0.24	0.24	0.24				0.15	0.62		0.40	0.40	0.40
v/c Ratio	0.51	0.47	0.76				0.62	0.41		0.30	0.37	0.51
Control Delay	19.8	19.2	8.8				29.7	6.6		7.5	3.9	2.1
Queue Delay	3.5	2.9	1.2				0.0	0.0		0.0	0.0	0.2
Total Delay	23.2	22.1	10.0				29.7	6.6		7.5	3.9	2.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	B				C	A		A	A	A
Approach Delay		15.9						11.3			3.3	
Approach LOS		B						B			A	
Queue Length 50th (ft)	50	48	31				57	82		4	24	1
Queue Length 95th (ft)	85	m83	75				93	110		m6	m35	m8
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250					
Base Capacity (vph)	1001	1031	1336				526	3108		141	1410	905
Starvation Cap Reductn	477	513	201				0	0		0	0	0
Spillback Cap Reductn	0	0	0				0	0		0	0	66
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.80	0.76	0.82				0.62	0.41		0.30	0.37	0.55

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 11.3 Intersection LOS: B
Intersection Capacity Utilization 50.0% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



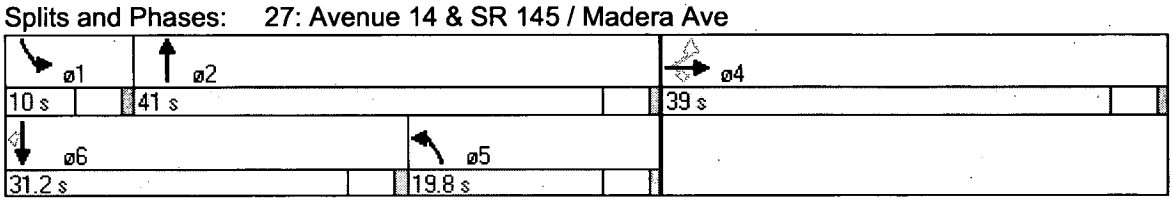
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		2	0		0	2		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50		50	50	50
Trailing Detector (ft)	0	0	0				0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	0.88	1.00	1.00	1.00	0.97	0.91	0.91	1.00	0.95	1.00
Frt			0.850					0.992				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3367	3471	2733	0	0	0	3433	5045	0	1770	3539	1583
Flt Permitted	0.950						0.950			0.950		
Satd. Flow (perm)	3367	3471	2733	0	0	0	3433	5045	0	1770	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			840					11				475
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	471	547	1264	0	0	0	341	1714	96	82	627	437
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	512	595	1374	0	0	0	371	1863	104	89	682	475
Lane Group Flow (vph)	512	595	1374	0	0	0	371	1967	0	89	682	475
Turn Type	Perm		Perm				Prot			Prot		Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4									6
Detector Phases	4	4	4				5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6		8.6	20.6	20.6
Total Split (s)	39.0	39.0	39.0	0.0	0.0	0.0	19.8	41.0	0.0	10.0	31.2	31.2
Total Split (%)	43.3%	43.3%	43.3%	0.0%	0.0%	0.0%	22.0%	45.6%	0.0%	11.1%	34.7%	34.7%
Maximum Green (s)	34.4	34.4	34.4				15.2	36.4		5.4	26.6	26.6
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0		1.0	1.0	1.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max				None	Min		None	Min	Min
Walk Time (s)	5.0	5.0	5.0					5.0			5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0			0	0
Act Effct Green (s)	36.5	36.5	36.5				15.6	37.5		6.0	25.9	25.9
Actuated g/C Ratio	0.41	0.41	0.41				0.17	0.42		0.07	0.29	0.29
v/c Ratio	0.38	0.42	0.85				0.62	0.93		0.75	0.67	0.60
Control Delay	18.1	18.6	12.9				39.6	34.9		64.2	10.0	4.2
Queue Delay	15.1	34.1	23.9				0.0	0.0		0.0	0.0	0.4
Total Delay	33.3	52.7	36.8				39.6	34.9		64.2	10.0	4.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D	D				D	C		E	B	A
Approach Delay		39.9						35.6			11.8	
Approach LOS		D						D			B	
Queue Length 50th (ft)	91	107	132				101	383		49	84	32
Queue Length 95th (ft)	m126	m153	#237				147	#500		m55	m93	m36
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250					
Base Capacity (vph)	1365	1408	1608				603	2109		118	1070	810
Starvation Cap Reductn	837	840	288				0	0		0	0	0
Spillback Cap Reductn	0	0	0				0	0		0	0	77
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.97	1.05	1.04				0.62	0.93		0.75	0.64	0.65

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (98%), Referenced to phase 4:EBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 32.5 Intersection LOS: C
Intersection Capacity Utilization 68.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	Mitigated 2030 Project AM		

Project Description 04-837.1 Alternative A

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	420			333	225
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	71	477	0	0	378	255
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						250
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	284
Percent Heavy Vehicles	0	0	0	0	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (veh/h)	71							284
C (m) (veh/h)	743							616
v/c	0.10							0.46
95% queue length	0.32							2.42
Control Delay (s/veh)	10.4							15.7
LOS	B							C
Approach Delay (s/veh)	–	–				15.7		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/31/2006 9:27 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Ave 18 1/2 @ Pistachio*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*8/30/2006*	Analysis Year	*2030*
Analysis Time Period	*Mitigated 2030 Project PM*		

Project Description *04-837.1 Alternative A*

East/West Street: *Avenue 18 1/2*	North/South Street: *Pistachio*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	607			483	263
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	689	0	0	548	298
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						280
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	318
Percent Heavy Vehicles	0	0	0	0	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (veh/h)	82							318
C (m) (veh/h)	612							563
v/c	0.13							0.56
95% queue length	0.46							3.50
Control Delay (s/veh)	11.8							19.4
LOS	B							C
Approach Delay (s/veh)	–	–				19.4		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/31/2006 9:28 AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.914			0.896				0.850		0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1608	0	2398	1166	0	1504	1583	1346	1008	1048	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1608	0	2398	1166	0	1504	1583	1346	1008	1048	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		60			131				278		5	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1597			696			822			681	
Travel Time (s)		31.1			13.6			18.7			15.5	
Volume (vph)	5	40	53	471	51	115	30	78	245	111	45	4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	46%	46%	46%	20%	20%	20%	79%	79%	79%
Adj. Flow (vph)	6	45	60	535	58	131	34	89	278	126	51	5
Lane Group Flow (vph)	6	105	0	535	189	0	34	89	278	126	56	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.6	20.6		8.6	20.6		8.6	20.6	20.6	8.6	20.6	
Total Split (s)	8.6	21.4	0.0	23.0	35.8	0.0	10.6	20.6	20.6	15.0	25.0	0.0
Total Split (%)	10.8%	26.8%	0.0%	28.8%	44.8%	0.0%	13.3%	25.8%	25.8%	18.8%	31.3%	0.0%
Maximum Green (s)	4.0	16.8		18.4	31.2		6.0	16.0	16.0	10.4	20.4	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	5.9	19.8		22.6	44.6		6.5	10.7	10.7	11.0	19.3	
Actuated g/C Ratio	0.07	0.25		0.28	0.56		0.08	0.13	0.13	0.14	0.24	
v/c Ratio	0.05	0.24		0.79	0.27		0.28	0.42	0.66	0.91	0.22	
Control Delay	35.8	14.6		32.6	3.9		40.8	36.8	12.3	93.1	25.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	35.8	14.6		32.6	3.9		40.8	36.8	12.3	93.1	25.9	
LOS	D	B		C	A		D	D	B	F	C	
Approach Delay		15.7			25.1			20.1			72.4	

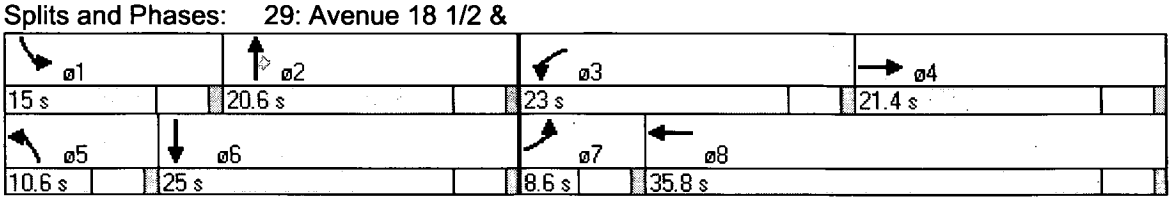
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			C			E	
90th %ile Green (s)	4.3	16.8		18.7	31.2		6.0	15.7	15.7	10.4	20.1	
90th %ile Term Code	Max	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
70th %ile Green (s)	0.0	16.8		23.2	44.6		6.0	11.2	11.2	10.4	15.6	
70th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
50th %ile Green (s)	0.0	16.8		24.8	46.2		6.0	9.6	9.6	10.4	14.0	
50th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
30th %ile Green (s)	0.0	19.3		23.9	47.8		0.0	8.0	8.0	10.4	23.0	
30th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
10th %ile Green (s)	0.0	26.1		19.3	50.0		0.0	5.8	5.8	10.4	20.8	
10th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
Queue Length 50th (ft)	3	18		113	1		16	42	0	63	22	
Queue Length 95th (ft)	14	57		#217	61		43	76	58	#159	49	
Internal Link Dist (ft)		1517			616			742			601	
Turn Bay Length (ft)												
Base Capacity (vph)	124	443		677	707		124	328	500	139	287	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.05	0.24		0.79	0.27		0.27	0.27	0.56	0.91	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 44 (55%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.0 Intersection LOS: C
Intersection Capacity Utilization 39.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 29: Avenue 18 1/2 &



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.931			0.916				0.850		0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1734	0	3433	1706	0	1770	1863	1583	1770	1840	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1734	0	3433	1706	0	1770	1863	1583	1770	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			96				465		5	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1597			696			822			681	
Travel Time (s)		31.1			13.6			18.7			15.5	
Volume (vph)	12	90	77	604	100	127	42	89	409	127	63	5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	14	102	88	686	114	144	48	101	465	144	72	6
Lane Group Flow (vph)	14	190	0	686	258	0	48	101	465	144	78	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.6	20.6		8.6	20.6		8.6	20.6	20.6	8.6	20.6	
Total Split (s)	8.6	21.0	0.0	24.0	36.4	0.0	10.4	21.0	21.0	14.0	24.6	0.0
Total Split (%)	10.8%	26.3%	0.0%	30.0%	45.5%	0.0%	13.0%	26.3%	26.3%	17.5%	30.8%	0.0%
Maximum Green (s)	4.0	16.4		19.4	31.8		5.8	16.4	16.4	9.4	20.0	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	5.6	21.8		20.0	44.1		6.3	10.9	10.9	11.3	19.9	
Actuated g/C Ratio	0.07	0.27		0.25	0.55		0.08	0.14	0.14	0.14	0.25	
v/c Ratio	0.11	0.37		0.80	0.26		0.34	0.40	0.75	0.58	0.17	
Control Delay	37.8	21.5		32.1	6.1		41.9	34.9	11.6	42.6	23.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	37.8	21.5		32.1	6.1		41.9	34.9	11.6	42.6	23.3	
LOS	D	C		C	A		D	C	B	D	C	
Approach Delay		22.7			25.0			17.8			35.8	
Approach LOS		C			C			B			D	

J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	4.0	16.4		19.4	31.8		5.8	16.4	16.4	9.4	20.0	
90th %ile Term Code	Max	Coord		Max	Coord		Max	Max	Max	Max	Hold	
70th %ile Green (s)	0.0	16.4		19.4	40.4		5.8	11.8	11.8	14.0	20.0	
70th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
50th %ile Green (s)	0.0	20.6		19.4	44.6		5.8	9.4	9.4	12.2	15.8	
50th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Gap	Hold	
30th %ile Green (s)	0.0	24.0		19.4	48.0		0.0	8.0	8.0	10.2	22.8	
30th %ile Term Code	Skip	Coord		Max	Coord		Skip	Gap	Gap	Gap	Hold	
10th %ile Green (s)	0.0	28.7		19.4	52.7		0.0	6.0	6.0	7.5	18.1	
10th %ile Term Code	Skip	Coord		Hold	Coord		Skip	Gap	Gap	Gap	Hold	
Queue Length 50th (ft)	7	56		161	29		23	48	0	67	30	
Queue Length 95th (ft)	24	118		210	m78		55	82	68	#140	60	
Internal Link Dist (ft)		1517			616			742			601	
Turn Bay Length (ft)												
Base Capacity (vph)	123	509		858	984		142	396	703	257	491	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.11	0.37		0.80	0.26		0.34	0.26	0.66	0.56	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 40 (50%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 23.7 Intersection LOS: C
Intersection Capacity Utilization 51.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 29: Avenue 18 1/2 & Golden State Blvd / Road 23

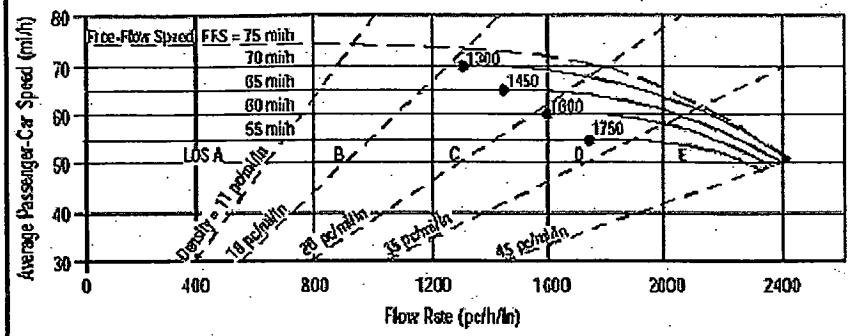
ATTACHMENT VI – C - 37

MITIGATED 2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4260*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

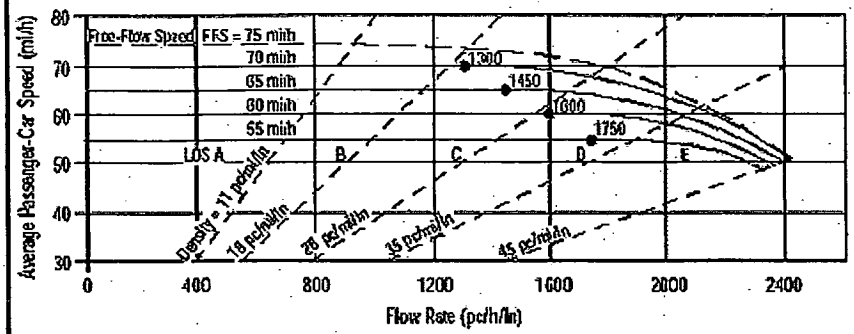
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1301*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*18.6*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt b

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4402*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1345*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*19.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

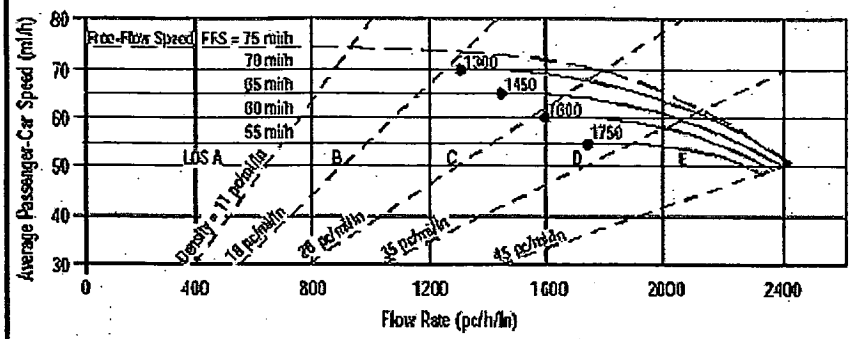
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3524*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1076*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*15.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

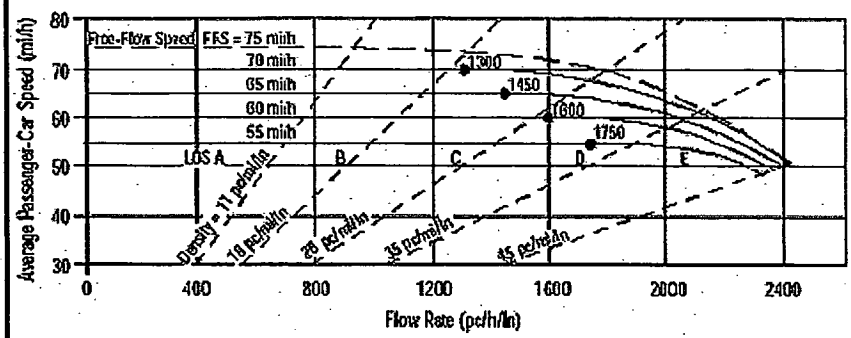
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5338*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1630*	pc/h/ln
S	*69.3*	mi/h
D = v_p / S	*23.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

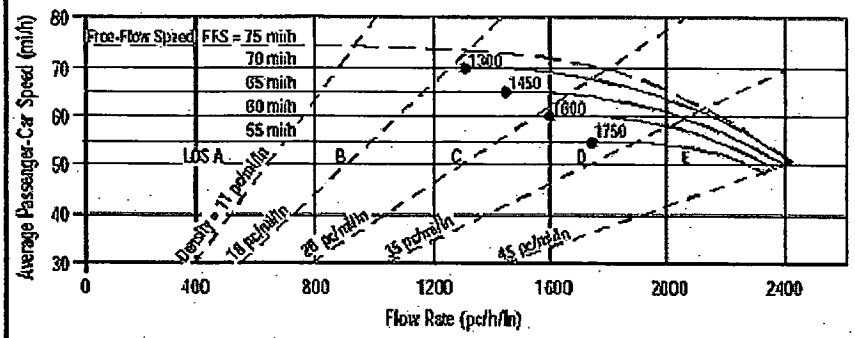
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4635*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

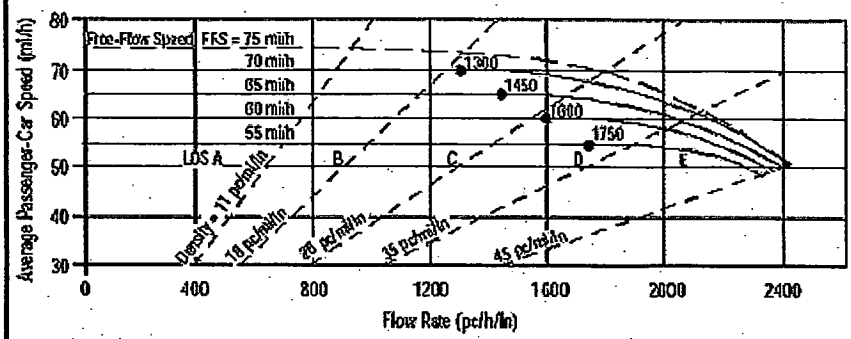
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1416*	pc/h/ln	Design LOS	
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*20.2*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4699*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

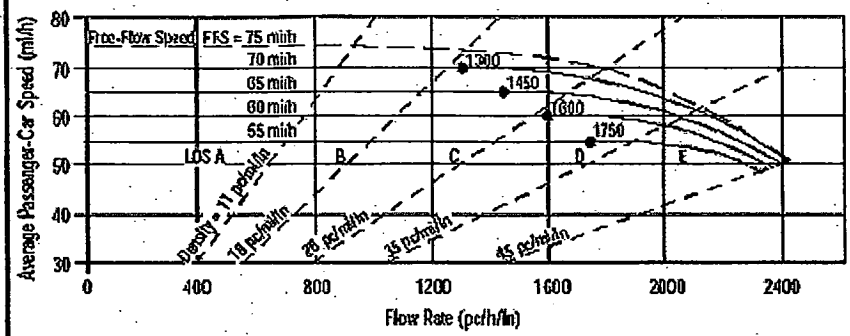
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1435*	pc/h/ln	Design LOS	
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*20.5*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3793*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1159*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*16.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

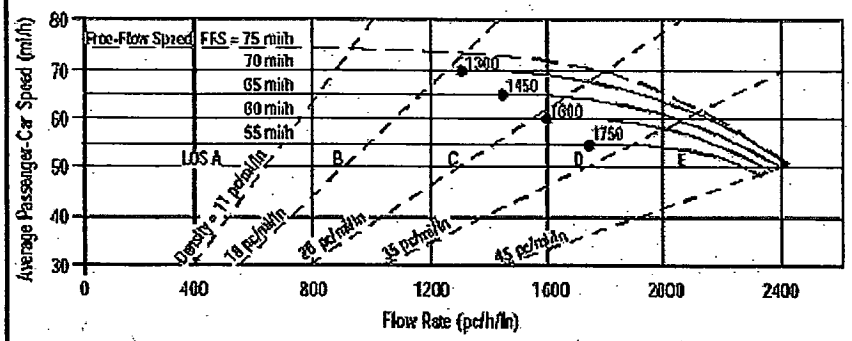
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2030 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5733*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1751*	pc/h/ln
S	*68.4*	mi/h
D = v_p / S	*25.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

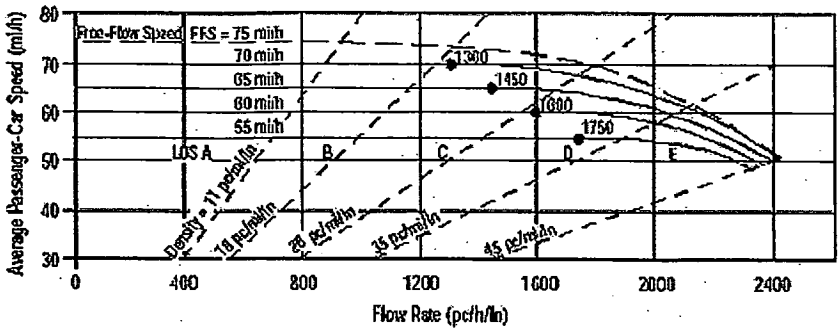
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5332*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

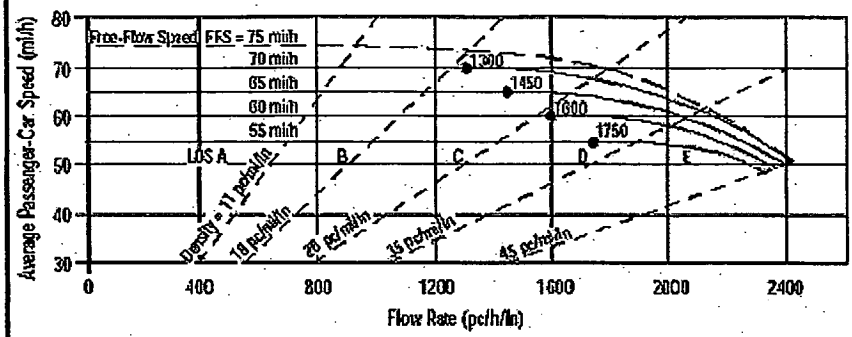
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1629*	pc/h/ln	Design LOS		
S	*69.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*23.5*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6315*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

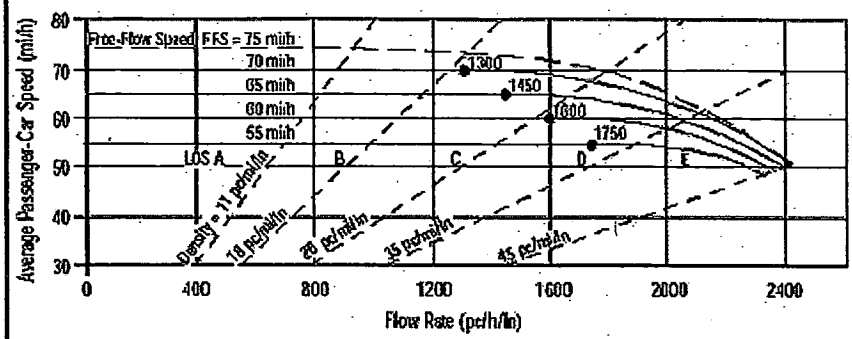
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1929*	pc/h/ln	Design LOS		
S	*66.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*29.2*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4051*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

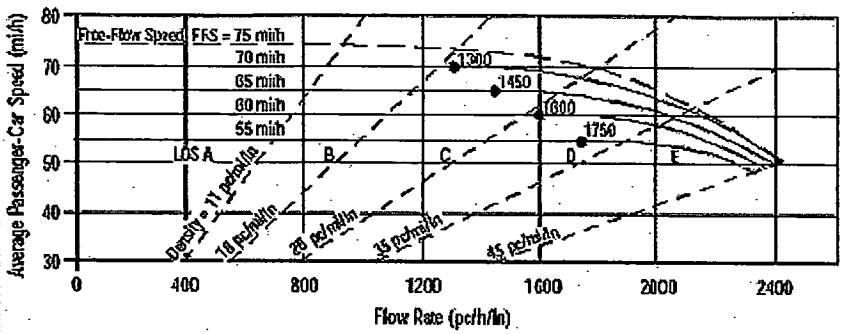
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1237*	pc/h/ln	Design LOS	
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*17.7*	pc/mi/ln	S	mi/h
LOS	*B*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt B

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7025*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2146*	pc/h/ln
S	*61.6*	mi/h
D = v_p / S	*34.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 38

MITIGATED 2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE B

INTERSECTION LEVEL OF SERVICE CALCULATIONS

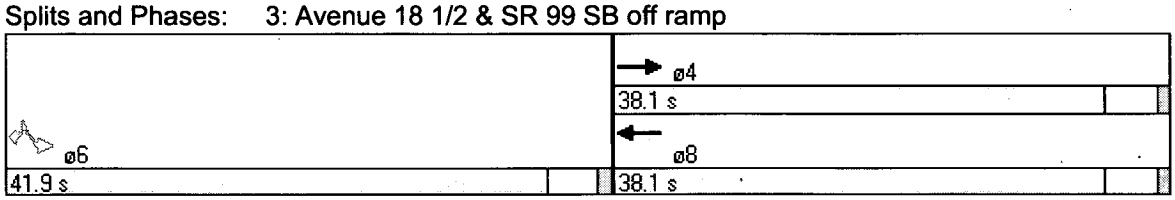
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	2798	2959	0	1318	1179
Flt Permitted					0.950	
Satd. Flow (perm)	0	2798	2959	0	1318	1179
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						303
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	499	298	0	34	267
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	567	339	0	39	303
Lane Group Flow (vph)	0	567	339	0	39	303
Turn Type						custom
Protected Phases		4	8			
Permitted Phases					6	6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.9	20.9		20.9	20.9
Total Split (s)	0.0	38.1	38.1	0.0	41.9	41.9
Total Split (%)	0.0%	47.6%	47.6%	0.0%	52.4%	52.4%
Maximum Green (s)		33.5	33.5		37.3	37.3
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Max	Max
Act Effct Green (s)		34.1	34.1		37.9	37.9
Actuated g/C Ratio		0.43	0.43		0.47	0.47
v/c Ratio		0.48	0.27		0.06	0.42
Control Delay		13.2	3.8		11.9	3.6
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		13.2	3.8		11.9	3.6
LOS		B	A		B	A
Approach Delay		13.2	3.8		4.6	
Approach LOS		B	A		A	
90th %ile Green (s)		33.5	33.5		37.3	37.3
90th %ile Term Code		Coord	Coord		MaxR	MaxR

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		33.5	33.5		37.3	37.3
70th %ile Term Code		Coord	Coord		MaxR	MaxR
50th %ile Green (s)		33.5	33.5		37.3	37.3
50th %ile Term Code		Coord	Coord		MaxR	MaxR
30th %ile Green (s)		33.5	33.5		37.3	37.3
30th %ile Term Code		Coord	Coord		MaxR	MaxR
10th %ile Green (s)		33.5	33.5		37.3	37.3
10th %ile Term Code		Coord	Coord		MaxR	MaxR
Queue Length 50th (ft)		82	8		10	0
Queue Length 95th (ft)		m90	m7		26	38
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		1193	1261		624	718
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.48	0.27		0.06	0.42

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 76 (95%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 8.3 Intersection LOS: A
Intersection Capacity Utilization 35.4% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	2798	2959	0	1318	1179
Flt Permitted					0.950	
Satd. Flow (perm)	0	2798	2959	0	1318	1179
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						317
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	680	348	0	65	423
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	773	395	0	74	481
Lane Group Flow (vph)	0	773	395	0	74	481
Turn Type						custom
Protected Phases		4	8			
Permitted Phases					6	6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.9	20.9		20.9	20.9
Total Split (s)	0.0	33.0	33.0	0.0	37.0	37.0
Total Split (%)	0.0%	47.1%	47.1%	0.0%	52.9%	52.9%
Maximum Green (s)		28.4	28.4		32.4	32.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Max	Max
Act Effct Green (s)		29.0	29.0		33.0	33.0
Actuated g/C Ratio		0.41	0.41		0.47	0.47
v/c Ratio		0.67	0.32		0.12	0.67
Control Delay		15.6	3.7		11.1	10.0
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		15.6	3.7		11.1	10.0
LOS		B	A		B	A
Approach Delay		15.6	3.7		10.1	
Approach LOS		B	A		B	
90th %ile Green (s)		28.4	28.4		32.4	32.4
90th %ile Term Code		Coord	Coord		MaxR	MaxR

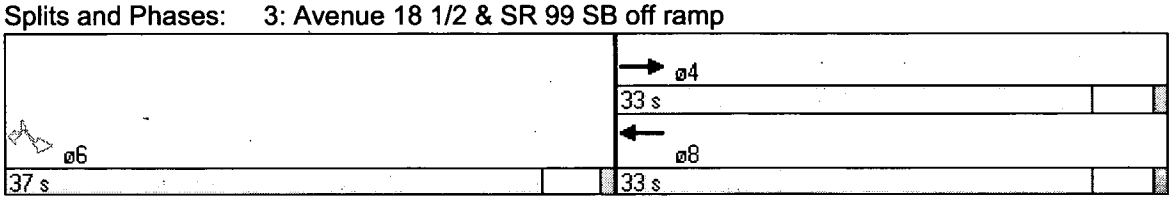
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		28.4	28.4		32.4	32.4
70th %ile Term Code		Coord	Coord		MaxR	MaxR
50th %ile Green (s)		28.4	28.4		32.4	32.4
50th %ile Term Code		Coord	Coord		MaxR	MaxR
30th %ile Green (s)		28.4	28.4		32.4	32.4
30th %ile Term Code		Coord	Coord		MaxR	MaxR
10th %ile Green (s)		28.4	28.4		32.4	32.4
10th %ile Term Code		Coord	Coord		MaxR	MaxR
Queue Length 50th (ft)		113	12		17	41
Queue Length 95th (ft)		m143	m12		38	132
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		1159	1226		621	723
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.67	0.32		0.12	0.67

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 1 (1%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 11.1 Intersection LOS: B
Intersection Capacity Utilization 42.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	2		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.956				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	2366	2439	0	0	3166	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	2366	2439	0	0	3166	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					55				19			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	253	84	0	0	116	48	243	0	36	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	288	95	0	0	132	55	276	0	41	0	0	0
Lane Group Flow (vph)	288	95	0	0	187	0	0	276	41	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	31.0	52.0	0.0	0.0	21.0	0.0	28.0	28.0	28.0	0.0	0.0	0.0
Total Split (%)	38.8%	65.0%	0.0%	0.0%	26.3%	0.0%	35.0%	35.0%	35.0%	0.0%	0.0%	0.0%
Maximum Green (s)	26.4	47.4			16.4		23.4	23.4	23.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	27.0	51.7			20.7			20.3	20.3			
Actuated g/C Ratio	0.34	0.65			0.26			0.25	0.25			
v/c Ratio	0.36	0.06			0.22			0.81	0.13			
Control Delay	6.7	1.4			18.4			46.7	14.6			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	6.7	1.4			18.4			46.7	14.6			

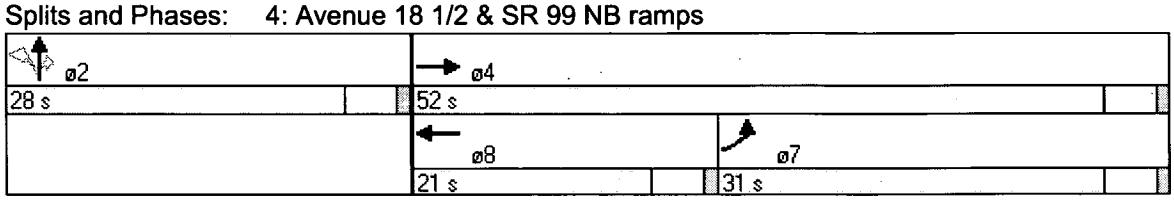
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A			B			D	B			
Approach Delay		5.4			18.4			42.5				
Approach LOS		A			B			D				
90th %ile Green (s)	26.4	47.4			16.4		23.4	23.4	23.4			
90th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	26.4	47.4			16.4		23.4	23.4	23.4			
70th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	26.4	49.6			18.6		21.2	21.2	21.2			
50th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
30th %ile Green (s)	26.4	53.0			22.0		17.8	17.8	17.8			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	26.4	57.9			26.9		12.9	12.9	12.9			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	19	1			27			126	8			
Queue Length 95th (ft)	30	3			54			#203	30			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	799	1575			858			401	372			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.36	0.06			0.22			0.69	0.11			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 35.4% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	2		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.974				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	2870	2959	0	0	3058	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	2870	2959	0	0	3058	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					33				39			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	374	120	0	0	169	35	281	0	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	425	136	0	0	192	40	319	0	89	0	0	0
Lane Group Flow (vph)	425	136	0	0	232	0	0	319	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	27.0	48.0	0.0	0.0	21.0	0.0	22.0	22.0	22.0	0.0	0.0	0.0
Total Split (%)	38.6%	68.6%	0.0%	0.0%	30.0%	0.0%	31.4%	31.4%	31.4%	0.0%	0.0%	0.0%
Maximum Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	23.0	44.8			17.8			17.2	17.2			
Actuated g/C Ratio	0.33	0.64			0.25			0.25	0.25			
v/c Ratio	0.45	0.07			0.29			0.86	0.25			
Control Delay	7.9	3.1			19.5			49.6	15.1			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	7.9	3.1			19.5			49.6	15.1			

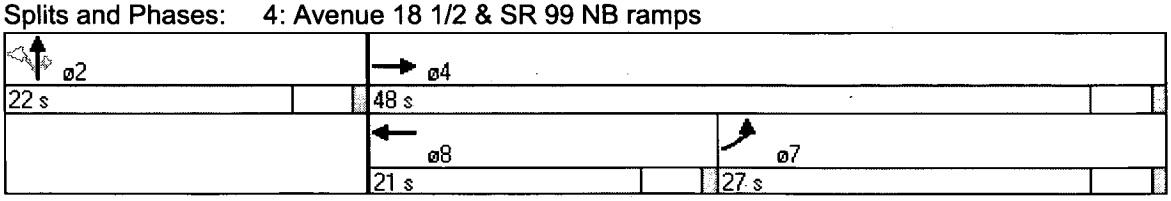
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A			B			D	B			
Approach Delay		6.7			19.5			42.1				
Approach LOS		A			B			D				
90th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
90th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
70th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
50th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	22.4	43.4			16.4		17.4	17.4	17.4			
30th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
10th %ile Green (s)	22.4	47.4			20.4		13.4	13.4	13.4			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	15	4			36			129	17			
Queue Length 95th (ft)	29	m8			63			#250	49			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	943	1894			803			387	375			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.45	0.07			0.29			0.82	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 68 (97%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 42.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↖↖	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	4848	5036	0	3303	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	4848	5036	0	3303	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						11
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1432	1479	0	155	244
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	1627	1681	0	176	277
Lane Group Flow (vph)	0	1627	1681	0	176	277
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	39.2	39.2	0.0	30.8	30.8
Total Split (%)	0.0%	56.0%	56.0%	0.0%	44.0%	44.0%
Maximum Green (s)		33.9	33.9		25.5	25.5
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		43.9	43.9		18.1	18.1
Actuated g/C Ratio		0.63	0.63		0.26	0.26
v/c Ratio		0.54	0.53		0.21	0.69
Control Delay		2.3	4.2		19.4	30.7
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		2.3	4.2		19.4	30.7
LOS		A	A		B	C
Approach Delay		2.3	4.2		26.3	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)		21	16		30	104
Queue Length 95th (ft)		45	153		43	147
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		3039	3157		1265	590
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.54	0.53		0.14	0.47

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 52 (74%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 6.0 Intersection LOS: A
Intersection Capacity Utilization 52.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp

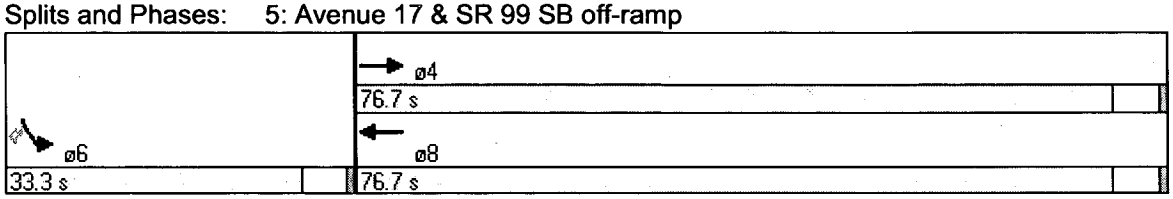
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↖↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	4988	4803	0	3242	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	4988	4803	0	3242	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						5
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	2859	2252	0	334	347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	3249	2559	0	380	394
Lane Group Flow (vph)	0	3249	2559	0	380	394
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	76.7	76.7	0.0	33.3	33.3
Total Split (%)	0.0%	69.7%	69.7%	0.0%	30.3%	30.3%
Maximum Green (s)		71.4	71.4		28.0	28.0
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		72.7	72.7		29.3	29.3
Actuated g/C Ratio		0.66	0.66		0.27	0.27
v/c Ratio		0.99	0.81		0.44	0.98
Control Delay		13.3	8.6		35.5	80.9
Queue Delay		0.2	0.1		0.0	0.0
Total Delay		13.5	8.7		35.5	80.9
LOS		B	A		D	F
Approach Delay		13.5	8.7		58.6	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		E	
Queue Length 50th (ft)		89	357		114	274
Queue Length 95th (ft)		#120	m276		156	#457
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		3297	3174		864	402
Starvation Cap Reductn		4	0		0	0
Spillback Cap Reductn		0	38		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.99	0.82		0.44	0.98

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 75 (68%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 16.9 Intersection LOS: B
Intersection Capacity Utilization 75.4% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



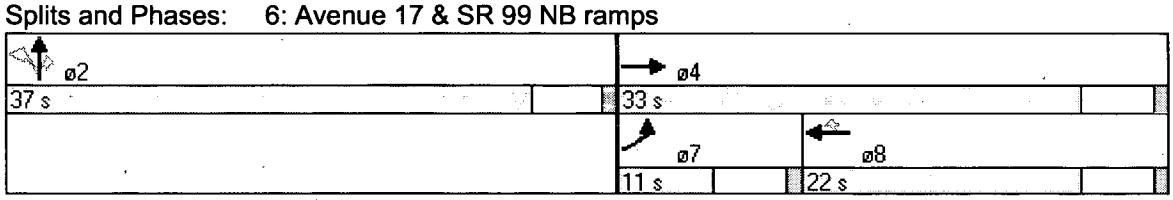
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.91	0.91	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.957				
Satd. Flow (prot)	3400	5036	0	0	5085	1583	3221	1622	2787	0	0	0
Flt Permitted	0.950						0.950	0.957				
Satd. Flow (perm)	3400	5036	0	0	5085	1583	3221	1622	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						81			434			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	146	404	0	0	782	71	1212	47	382	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	166	459	0	0	889	81	1377	53	434	0	0	0
Lane Group Flow (vph)	166	459	0	0	889	81	937	493	434	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	11.0	33.0	0.0	0.0	22.0	22.0	37.0	37.0	37.0	0.0	0.0	0.0
Total Split (%)	15.7%	47.1%	0.0%	0.0%	31.4%	31.4%	52.9%	52.9%	52.9%	0.0%	0.0%	0.0%
Maximum Green (s)	5.7	27.7			16.7	16.7	31.7	31.7	31.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	7.6	31.9			20.4	20.4	30.1	30.1	30.1			
Actuated g/C Ratio	0.11	0.46			0.29	0.29	0.43	0.43	0.43			
v/c Ratio	0.45	0.20			0.60	0.16	0.68	0.71	0.30			
Control Delay	33.4	4.8			24.1	6.5	18.4	22.1	1.8			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	33.4	4.8			24.1	6.5	18.4	22.1	1.8			
LOS	C	A			C	A	B	C	A			
Approach Delay		12.4			22.7			15.6				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			B				
Queue Length 50th (ft)	31	27			126	0	156	168	0			
Queue Length 95th (ft)	57	42			163	28	209	265	21			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	367	2296			1479	518	1518	765	1543			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.45	0.20			0.60	0.16	0.62	0.64	0.28			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 23 (33%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 52.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.91	0.91	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	3433	5085	0	0	5085	1583	3221	1615	2787	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	3433	5085	0	0	5085	1583	3221	1615	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						238			43			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	220	1005	0	0	1388	236	1746	5	1379	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	250	1142	0	0	1577	268	1984	6	1567	0	0	0
Lane Group Flow (vph)	250	1142	0	0	1577	268	1323	667	1567	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	12.2	49.0	0.0	0.0	36.8	36.8	61.0	61.0	61.0	0.0	0.0	0.0
Total Split (%)	11.1%	44.5%	0.0%	0.0%	33.5%	33.5%	55.5%	55.5%	55.5%	0.0%	0.0%	0.0%
Maximum Green (s)	6.9	43.7			31.5	31.5	55.7	55.7	55.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	8.2	45.0			32.8	32.8	57.0	57.0	57.0			
Actuated g/C Ratio	0.07	0.41			0.30	0.30	0.52	0.52	0.52			
v/c Ratio	0.98	0.55			1.04	0.42	0.79	0.80	1.07			
Control Delay	75.1	20.7			72.5	7.7	26.1	30.6	71.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	75.1	20.7			72.5	7.7	26.1	30.6	71.0			
LOS	E	C			E	A	C	C	E			
Approach Delay		30.5			63.1			46.7				
Approach LOS		C			E			D				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	89	174			~441	15	402	407	~690			
Queue Length 95th (ft)	m#102	m177			#517	73	481	570	#810			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	256	2080			1516	639	1669	837	1465			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.98	0.55			1.04	0.42	0.79	0.80	1.07			

Intersection Summary

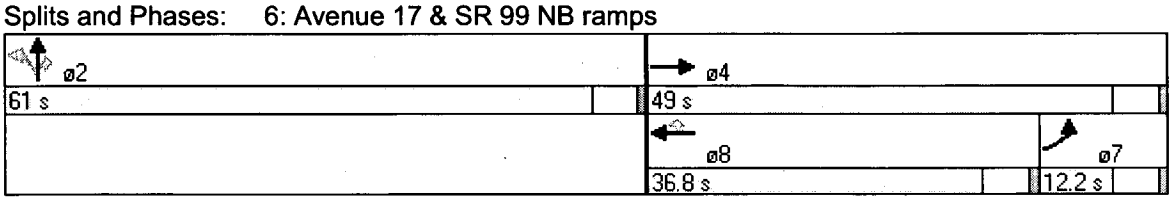
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 100 (91%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 47.8 Intersection LOS: D
Intersection Capacity Utilization 75.4% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



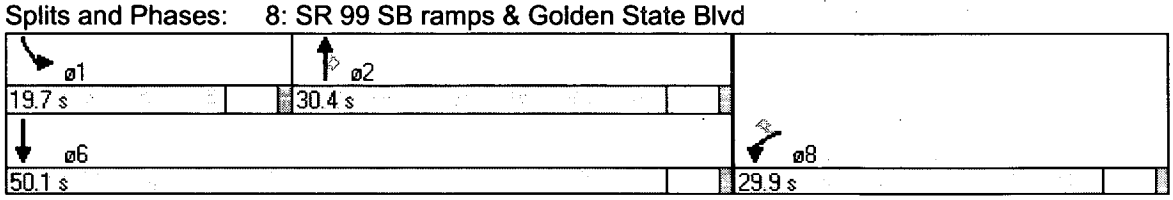
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	0.97	1.00	1.00	1.00	0.97	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3155	1455	1863	1583	3433	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3155	1455	1863	1583	3433	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		340		462		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	531	299	89	407	276	87
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	603	340	101	462	314	99
Lane Group Flow (vph)	603	340	101	462	314	99
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6	20.6	8.6	20.6
Total Split (s)	29.9	29.9	30.4	30.4	19.7	50.1
Total Split (%)	37.4%	37.4%	38.0%	38.0%	24.6%	62.6%
Maximum Green (s)	25.3	25.3	25.8	25.8	15.1	45.5
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	22.2	22.2	32.8	32.8	13.0	49.8
Actuated g/C Ratio	0.28	0.28	0.41	0.41	0.16	0.62
v/c Ratio	0.69	0.52	0.13	0.50	0.56	0.09
Control Delay	29.5	5.5	6.0	5.0	34.6	7.7
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	29.5	5.5	6.0	5.5	34.6	7.7
LOS	C	A	A	A	C	A
Approach Delay	20.8		5.6			28.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	C		A			C
Queue Length 50th (ft)	138	0	8	4	75	18
Queue Length 95th (ft)	160	47	m55	232	106	45
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	1053	712	788	936	682	1178
Starvation Cap Reductn	0	0	0	174	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.48	0.13	0.61	0.46	0.08

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 12 (15%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 17.9 Intersection LOS: B
Intersection Capacity Utilization 39.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



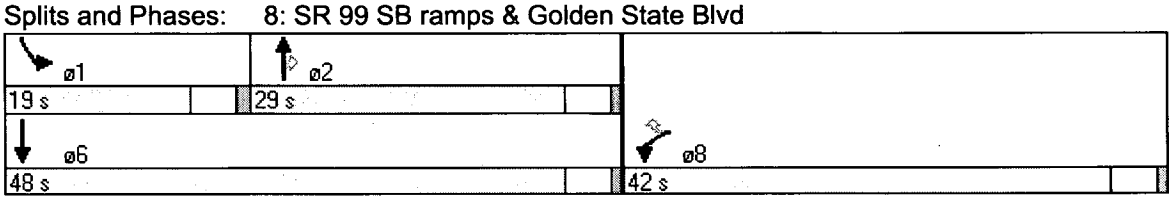
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	0.97	1.00	1.00	1.00	0.97	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3335	1538	1863	1583	3183	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3335	1538	1863	1583	3183	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		729		636		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	950	778	143	560	350	131
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	1080	884	162	636	398	149
Lane Group Flow (vph)	1080	884	162	636	398	149
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6	20.6	8.6	20.6
Total Split (s)	42.0	42.0	29.0	29.0	19.0	48.0
Total Split (%)	46.7%	46.7%	32.2%	32.2%	21.1%	53.3%
Maximum Green (s)	37.4	37.4	24.4	24.4	14.4	43.4
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	39.5	39.5	23.5	23.5	15.1	42.5
Actuated g/C Ratio	0.44	0.44	0.26	0.26	0.17	0.47
v/c Ratio	0.74	0.82	0.33	0.72	0.75	0.18
Control Delay	24.4	11.2	14.0	10.2	45.3	15.4
Queue Delay	0.1	0.0	0.0	4.7	0.0	0.0
Total Delay	24.5	11.2	14.0	14.9	45.3	15.4
LOS	C	B	B	B	D	B
Approach Delay	18.5		14.7			37.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		B			D
Queue Length 50th (ft)	226	47	42	104	108	53
Queue Length 95th (ft)	329	229	m44	m131	#159	79
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	1515	1097	556	919	551	871
Starvation Cap Reductn	0	0	0	211	0	0
Spillback Cap Reductn	29	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.81	0.29	0.90	0.72	0.17

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 76 (84%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 20.7 Intersection LOS: C
Intersection Capacity Utilization 62.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



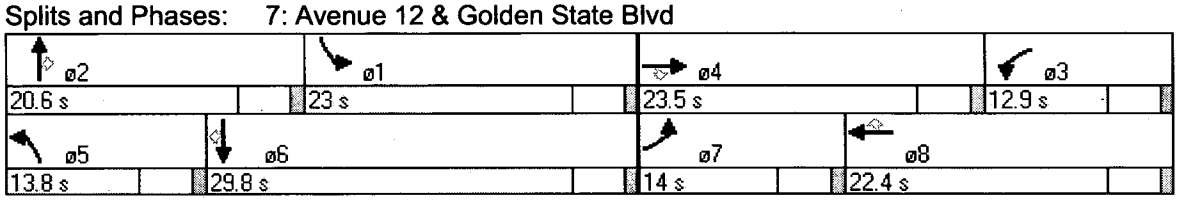
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	2		1	1		1	1		2	2		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3183	3282	1468	1703	3406	1524	1612	1696	2538	3335	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3183	3282	1468	1703	3406	1524	1612	1696	2538	3335	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26			267			441			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	242	296	24	113	446	246	70	8	406	523	18	77
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	263	322	26	123	485	267	76	9	441	568	20	84
Lane Group Flow (vph)	263	322	26	123	485	267	76	9	441	568	20	84
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	14.0	23.5	23.5	12.9	22.4	22.4	13.8	20.6	20.6	23.0	29.8	29.8
Total Split (%)	17.5%	29.4%	29.4%	16.1%	28.0%	28.0%	17.3%	25.8%	25.8%	28.8%	37.3%	37.3%
Maximum Green (s)	9.4	18.9	18.9	8.3	17.8	17.8	9.2	16.0	16.0	18.4	25.2	25.2
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	11.4	28.0	28.0	8.9	25.5	25.5	8.7	8.1	8.1	19.0	20.4	20.4
Actuated g/C Ratio	0.14	0.35	0.35	0.11	0.32	0.32	0.11	0.10	0.10	0.24	0.26	0.26
v/c Ratio	0.58	0.28	0.05	0.65	0.45	0.40	0.43	0.05	0.68	0.72	0.04	0.19
Control Delay	37.6	21.2	9.5	42.7	17.4	7.2	40.9	31.0	9.1	15.9	7.6	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	37.6	21.2	9.5	42.7	17.4	7.2	40.9	31.0	9.1	15.9	7.6	2.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	B	A	D	C	A	B	A	A
Approach Delay		27.8			17.9			14.1			14.0	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	62	58	0	63	114	41	36	4	0	140	5	13
Queue Length 95th (ft)	#104	108	19	m#119	174	m115	77	16	42	97	m3	m1
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	462	1150	531	189	1086	668	197	352	876	846	584	553
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	14	0	0
Spillback Cap Reductn	0	0	0	0	0	25	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.28	0.05	0.65	0.45	0.42	0.39	0.03	0.50	0.68	0.03	0.15

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 8 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 18.4 Intersection LOS: B
Intersection Capacity Utilization 50.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	2		1	1		1	1		2	2		1
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
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3273	3374	1509	1703	3406	1524	1687	1776	2656	3273	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3273	3374	1509	1703	3406	1524	1687	1776	2656	3273	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15			283			490			70
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	420	409	14	138	652	260	149	23	466	1005	12	64
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	457	445	15	150	709	283	162	25	507	1092	13	70
Lane Group Flow (vph)	457	445	15	150	709	283	162	25	507	1092	13	70
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	16.0	22.9	22.9	15.5	22.4	22.4	20.5	20.6	20.6	31.0	31.1	31.1
Total Split (%)	17.8%	25.4%	25.4%	17.2%	24.9%	24.9%	22.8%	22.9%	22.9%	34.4%	34.6%	34.6%
Maximum Green (s)	11.4	18.3	18.3	10.9	17.8	17.8	15.9	16.0	16.0	26.4	26.5	26.5
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	12.0	19.4	19.4	11.0	18.4	18.4	36.1	9.0	9.0	34.6	7.5	7.5
Actuated g/C Ratio	0.13	0.22	0.22	0.12	0.20	0.20	0.40	0.10	0.10	0.38	0.08	0.08
v/c Ratio	1.05	0.61	0.04	0.72	1.02	0.53	0.24	0.14	0.72	0.87	0.09	0.37
Control Delay	95.8	36.3	14.1	45.9	66.3	10.7	19.7	36.7	10.5	22.2	49.3	30.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
Total Delay	95.8	36.3	14.1	45.9	66.3	10.7	19.7	36.7	10.5	23.3	49.3	30.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D	B	D	E	B	B	D	B	C	D	C
Approach Delay		65.6			49.9			13.6			24.0	
Approach LOS		E			D			B			C	
Queue Length 50th (ft)	~146	122	0	86	~230	57	58	14	5	81	8	14
Queue Length 95th (ft)	#241	173	16	m#161	#345	124	113	35	51	#455	m13	m36
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	436	728	337	218	696	537	677	328	890	1258	535	503
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	48	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.05	0.61	0.04	0.69	1.02	0.53	0.24	0.08	0.57	0.90	0.02	0.14

Intersection Summary

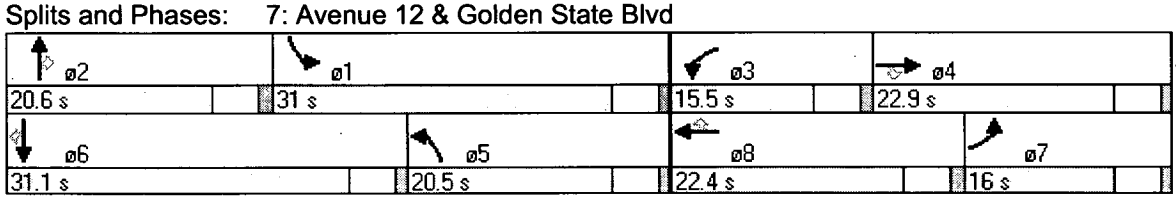
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 64 (71%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 39.4 Intersection LOS: D
Intersection Capacity Utilization 75.3% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		2	0		2	0		0
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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	3505	0	0	3471	2733	0	1618	2538	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	3505	0	0	3471	2733	0	1618	2538	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						1225			114			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	106	1119	0	0	559	1078	245	11	409	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	120	1272	0	0	635	1225	278	12	465	0	0	0
Lane Group Flow (vph)	120	1272	0	0	635	1225	0	290	465	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	16.1	52.1	0.0	0.0	36.0	36.0	27.9	27.9	27.9	0.0	0.0	0.0
Total Split (%)	20.1%	65.1%	0.0%	0.0%	45.0%	45.0%	34.9%	34.9%	34.9%	0.0%	0.0%	0.0%
Maximum Green (s)	11.5	47.5			31.4	31.4	23.3	23.3	23.3			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	11.1	52.5			39.6	39.6		19.5	19.5			
Actuated g/C Ratio	0.14	0.66			0.50	0.50		0.24	0.24			
v/c Ratio	0.49	0.55			0.37	0.62		0.73	0.66			
Control Delay	32.2	4.2			15.4	2.7		38.8	24.4			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	32.2	4.2			15.4	2.7		38.8	24.4			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		D	C			
Approach Delay		6.6			7.0			29.9				
Approach LOS		A			A			C				
Queue Length 50th (ft)	60	47			108	0		133	88			
Queue Length 95th (ft)	m84	91			160	34		198	128			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	265	2299			1718	1971		483	838			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.45	0.55			0.37	0.62		0.60	0.55			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 58 (73%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 67.7% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps

ø2	ø4		
27.9 s	52.1 s		
	ø8	ø7	
	36 s	16.1 s	

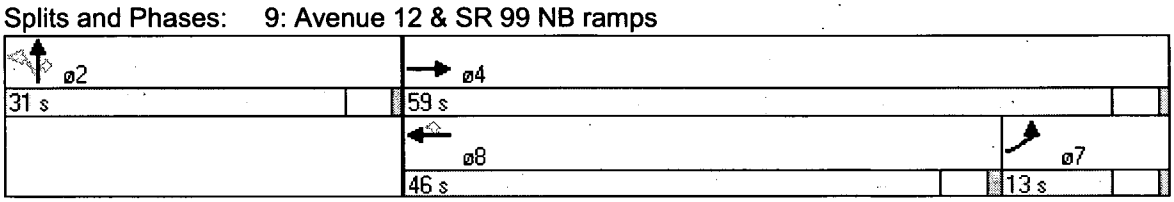
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		2	0		2	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	3438	0	0	3438	2707	0	1661	2608	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	3438	0	0	3438	2707	0	1661	2608	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						1509			22			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	126	1752	0	0	759	1569	292	3	658	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	143	1991	0	0	862	1783	332	3	748	0	0	0
Lane Group Flow (vph)	143	1991	0	0	862	1783	0	335	748	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	13.0	59.0	0.0	0.0	46.0	46.0	31.0	31.0	31.0	0.0	0.0	0.0
Total Split (%)	14.4%	65.6%	0.0%	0.0%	51.1%	51.1%	34.4%	34.4%	34.4%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	54.4			41.4	41.4	26.4	26.4	26.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	55.1			42.1	42.1		26.9	26.9			
Actuated g/C Ratio	0.10	0.61			0.47	0.47		0.30	0.30			
v/c Ratio	0.83	0.95			0.54	0.86		0.67	0.94			
Control Delay	60.1	17.6			18.6	8.5		35.6	51.4			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	60.1	17.6			18.6	8.5		35.6	51.4			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	B			B	A		D	D			
Approach Delay		20.5			11.8			46.5				
Approach LOS		C			B			D				
Queue Length 50th (ft)	85	236			176	50		166	228			
Queue Length 95th (ft)	m#125	#697			225	138		253	#342			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	172	2104			1607	2069		498	798			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.83	0.95			0.54	0.86		0.67	0.94			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 88.2% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



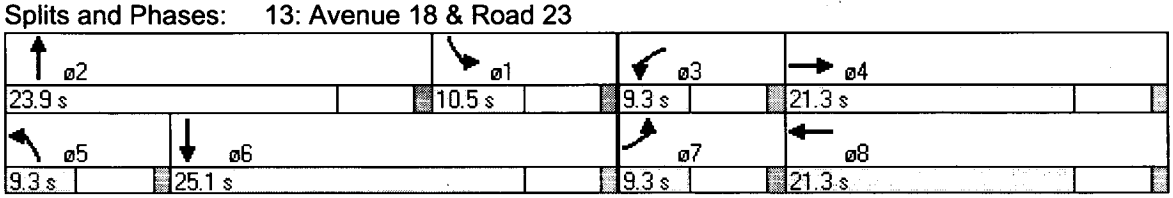
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.909			0.908			0.999			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1693	0	1770	1691	0	1770	1861	0	1770	1852	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1693	0	1770	1691	0	1770	1861	0	1770	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			33						4	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		41.0			42.4			36.1			35.9	
Volume (vph)	15	8	13	2	19	30	18	300	2	57	289	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	9	14	2	21	33	20	326	2	62	314	14
Lane Group Flow (vph)	16	23	0	2	54	0	20	328	0	62	328	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	23.9	0.0	10.5	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	36.8%	0.0%	16.2%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.6		5.2	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.1	9.1		6.1	9.2		6.1	48.1		7.6	51.2	
Actuated g/C Ratio	0.09	0.13		0.09	0.13		0.09	0.76		0.11	0.80	
v/c Ratio	0.11	0.10		0.01	0.22		0.13	0.23		0.32	0.22	
Control Delay	23.6	13.2		23.0	12.3		23.8	7.9		23.5	5.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.6	13.2		23.0	12.3		23.8	7.9		23.5	5.9	
LOS	C	B		C	B		C	A		C	A	
Approach Delay		17.5			12.7			8.8			8.7	
Approach LOS		B			B			A			A	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	2	1		0	3		3	0		9	0	
Queue Length 95th (ft)	20	19		6	32		23	154		51	147	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	152	426		152	440		152	1404		192	1489	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.05		0.01	0.12		0.13	0.23		0.32	0.22	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 63.7
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.32
Intersection Signal Delay: 9.4 Intersection LOS: A
Intersection Capacity Utilization 36.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 13: Avenue 18 & Road 23



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.932			0.868			0.999			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1736	0	1770	1617	0	1770	1861	0	1770	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1736	0	1770	1617	0	1770	1861	0	1770	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			96			1			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		41.0			42.4			36.1			35.9	
Volume (vph)	12	11	9	2	12	88	25	444	4	75	457	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	12	10	2	13	96	27	483	4	82	497	11
Lane Group Flow (vph)	13	22	0	2	109	0	27	487	0	82	508	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	25.1	0.0	9.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	38.6%	0.0%	14.3%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.8		4.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.9	9.5		5.9	9.5		5.9	38.3		6.1	43.5	
Actuated g/C Ratio	0.08	0.14		0.08	0.14		0.08	0.60		0.09	0.68	
v/c Ratio	0.09	0.09		0.01	0.35		0.18	0.44		0.52	0.40	
Control Delay	25.3	14.8		24.0	9.4		26.9	11.8		34.1	9.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.3	14.8		24.0	9.4		26.9	11.8		34.1	9.4	
LOS	C	B		C	A		C	B		C	A	
Approach Delay		18.7			9.6			12.6			12.8	
Approach LOS		B			A			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	3	3		1	3		7	84		20	44	
Queue Length 95th (ft)	18	19		6	39		29	#275		#76	#294	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	146	457		146	490		146	1109		159	1256	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.05		0.01	0.22		0.18	0.44		0.52	0.40	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 64.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 12.6 Intersection LOS: B
Intersection Capacity Utilization 45.3% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Avenue 18 & Road 23

ø1	ø2	ø3	ø4
9.3 s	25.1 s	9.3 s	21.3 s
ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

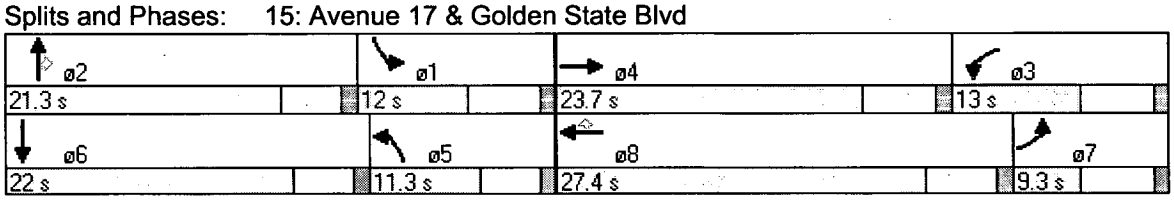
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	1.00	1.00	0.88	0.94	1.00	1.00
Frt		0.990				0.850			0.850		0.918	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	5034	0	3367	4988	1553	1492	1570	2349	4990	1710	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	5034	0	3367	4988	1553	1492	1570	2349	4990	1710	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				500			285		18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	37	841	62	231	998	460	49	32	262	308	14	17
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	40	914	67	251	1085	500	53	35	285	335	15	18
Lane Group Flow (vph)	40	981	0	251	1085	500	53	35	285	335	33	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3	21.3	9.3	21.3	
Total Split (s)	9.3	23.7	0.0	13.0	27.4	27.4	11.3	21.3	21.3	12.0	22.0	0.0
Total Split (%)	13.3%	33.9%	0.0%	18.6%	39.1%	39.1%	16.1%	30.4%	30.4%	17.1%	31.4%	0.0%
Maximum Green (s)	4.0	18.4		7.7	22.1	22.1	6.7	16.7	16.7	6.7	17.4	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6	3.6	4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max	Max	None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	5.3	19.7		9.0	27.1	27.1	6.9	17.3	17.3	8.0	22.5	
Actuated g/C Ratio	0.08	0.28		0.13	0.39	0.39	0.10	0.25	0.25	0.11	0.32	
v/c Ratio	0.30	0.69		0.58	0.56	0.55	0.36	0.09	0.36	0.59	0.06	
Control Delay	36.8	25.0		27.2	12.5	3.4	36.5	21.1	4.5	34.1	13.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	36.8	25.0		27.2	12.5	3.4	36.5	21.1	4.5	34.1	13.1	
LOS	D	C		C	B	A	D	C	A	C	B	
Approach Delay		25.4			12.0			10.6			32.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	17	134		56	117	40	22	12	0	49	5	
Queue Length 95th (ft)	45	177		m84	101	21	54	33	29	75	24	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	134	1428		433	1931	908	156	388	796	570	563	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.30	0.69		0.58	0.56	0.55	0.34	0.09	0.36	0.59	0.06	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 60 (86%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 17.8 Intersection LOS: B
Intersection Capacity Utilization 46.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



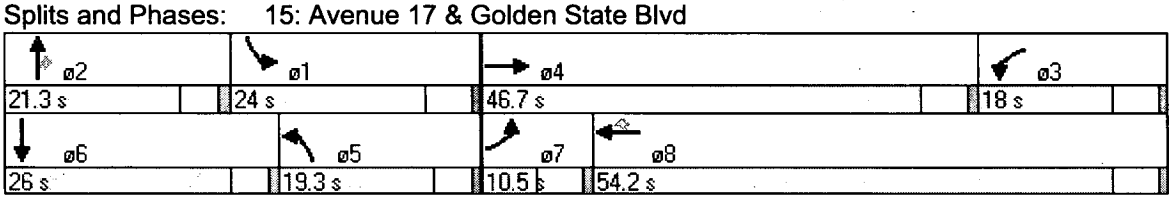
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	1.00	1.00	0.88	0.94	1.00	1.00
Frt		0.994				0.850			0.850		0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	5055	0	3213	4759	1482	1736	1827	2733	4990	1704	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	5055	0	3213	4759	1482	1736	1827	2733	4990	1704	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				759			390		46	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	56	1598	71	334	1507	698	110	48	476	777	32	42
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	61	1737	77	363	1638	759	120	52	517	845	35	46
Lane Group Flow (vph)	61	1814	0	363	1638	759	120	52	517	845	81	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3	21.3	9.3	21.3	
Total Split (s)	10.5	46.7	0.0	18.0	54.2	54.2	19.3	21.3	21.3	24.0	26.0	0.0
Total Split (%)	9.5%	42.5%	0.0%	16.4%	49.3%	49.3%	17.5%	19.4%	19.4%	21.8%	23.6%	0.0%
Maximum Green (s)	5.2	41.4		12.7	48.9	48.9	14.7	16.7	16.7	18.7	21.4	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6	3.6	4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max	Max	None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	6.5	42.7		14.0	52.3	52.3	15.3	17.3	17.3	20.0	22.0	
Actuated g/C Ratio	0.06	0.39		0.13	0.48	0.48	0.14	0.16	0.16	0.18	0.20	
v/c Ratio	0.58	0.92		0.89	0.72	0.69	0.50	0.18	0.68	0.93	0.21	
Control Delay	72.7	41.1		56.3	18.7	5.5	51.7	42.2	16.2	62.1	20.0	
Queue Delay	0.0	0.6		0.0	0.9	1.8	0.0	0.0	0.1	5.1	0.0	
Total Delay	72.7	41.7		56.3	19.7	7.3	51.7	42.2	16.2	67.2	20.0	
LOS	E	D		E	B	A	D	D	B	E	C	
Approach Delay		42.7			21.1			24.4			63.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			C			C			E	
Queue Length 50th (ft)	43	439		0	310	141	79	32	45	210	20	
Queue Length 95th (ft)	#101	#524		m#182	m369	m202	140	69	108	#289	62	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	105	1967		409	2263	1103	241	287	758	907	378	
Starvation Cap Reductn	0	0		0	336	193	0	0	0	0	0	
Spillback Cap Reductn	0	30		0	0	0	0	0	10	40	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.58	0.94		0.89	0.85	0.83	0.50	0.18	0.69	0.97	0.21	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 108 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 34.2 Intersection LOS: C
Intersection Capacity Utilization 73.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.855			0.997			0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1674	0	1626	1464	0	1504	1579	0	1570	1636	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1674	0	1626	1464	0	1504	1579	0	1570	1636	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			30			2			6	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	1	1	1	32	1	28	1	379	8	1	344	24
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	1	1	1	35	1	30	1	412	9	1	374	26
Lane Group Flow (vph)	1	2	0	35	31	0	1	421	0	1	400	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	25.1	0.0	9.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	38.6%	0.0%	14.3%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.8		4.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.4	8.3		6.9	9.0		6.4	67.6		6.4	67.6	
Actuated g/C Ratio	0.08	0.10		0.08	0.10		0.08	0.87		0.08	0.87	
v/c Ratio	0.01	0.01		0.26	0.17		0.01	0.30		0.01	0.28	
Control Delay	19.0	16.0		22.1	10.1		19.0	6.4		19.0	5.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.0	16.0		22.1	10.1		19.0	6.4		19.0	5.5	
LOS	B	B		C	B		B	A		B	A	
Approach Delay		17.0			16.5			6.4			5.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			A			A	
Queue Length 50th (ft)	0	0		11	0		0	0		0	0	
Queue Length 95th (ft)	4	6		33	19		4	#239		4	190	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	129	348		133	330		114	1381		118	1432	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.26	0.09		0.01	0.30		0.01	0.28	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 77.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 6.8 Intersection LOS: A
Intersection Capacity Utilization 35.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Avenue 15 1/2 & Road 23

ø1	ø2	ø4	ø3
9.3 s	25.1 s	21.3 s	9.3 s

ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.859			0.991			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1627	0	1736	1569	0	1703	1776	0	1556	1594	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1627	0	1736	1569	0	1703	1776	0	1556	1594	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			48			5			18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	1	2	2	38	3	44	2	527	33	1	498	111
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	1	2	2	41	3	48	2	573	36	1	541	121
Lane Group Flow (vph)	1	4	0	41	51	0	2	609	0	1	662	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	40.1	0.0	9.3	40.1	0.0
Total Split (%)	11.6%	26.6%	0.0%	11.6%	26.6%	0.0%	11.6%	50.1%	0.0%	11.6%	50.1%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	34.8		4.0	34.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.7	7.7		7.1	8.6		5.7	63.6		5.7	63.6	
Actuated g/C Ratio	0.07	0.09		0.08	0.10		0.07	0.79		0.07	0.79	
v/c Ratio	0.01	0.03		0.28	0.25		0.02	0.43		0.01	0.52	
Control Delay	29.0	23.5		30.4	12.2		29.5	6.9		29.0	8.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.0	23.5		30.4	12.2		29.5	6.9		29.0	8.9	
LOS	C	C		C	B		C	A		C	A	
Approach Delay		24.6			20.3			7.0			9.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			A			A	
Queue Length 50th (ft)	0	1		15	1		1	57		0	67	
Queue Length 95th (ft)	5	9		45	30		7	310		5	#439	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	108	312		145	352		110	1411		101	1269	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.28	0.14		0.02	0.43		0.01	0.52	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80.1
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 8.9 Intersection LOS: A
Intersection Capacity Utilization 48.4% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Avenue 15 1/2 & Road 23

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		1	1		2	2		0
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
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00
Frt		0.960				0.850			0.850		0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3398	0	3433	3539	1583	1752	3505	2760	2575	1302	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3398	0	3433	3539	1583	1752	3505	2760	2575	1302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		70				445			464		58	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	165	377	136	388	306	409	108	150	427	269	106	88
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	36%	36%	36%
Adj. Flow (vph)	179	410	148	422	333	445	117	163	464	292	115	96
Lane Group Flow (vph)	179	558	0	422	333	445	117	163	464	292	211	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9	20.9	8.9	20.9	20.9	8.9	20.9	
Total Split (s)	12.1	22.1	0.0	14.0	24.0	24.0	11.4	20.9	20.9	13.0	22.5	0.0
Total Split (%)	17.3%	31.6%	0.0%	20.0%	34.3%	34.3%	16.3%	29.9%	29.9%	18.6%	32.1%	0.0%
Maximum Green (s)	7.2	17.2		9.1	19.1	19.1	6.5	16.0	16.0	8.1	17.6	
Yellow Time (s)	3.9	3.9		3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	8.1	19.8		12.7	24.4	24.4	7.3	12.5	12.5	9.0	16.4	
Actuated g/C Ratio	0.12	0.28		0.18	0.35	0.35	0.10	0.18	0.18	0.13	0.23	
v/c Ratio	0.87	0.55		0.68	0.27	0.53	0.64	0.26	0.53	0.88	0.60	
Control Delay	71.2	21.6		27.5	13.4	5.6	47.9	24.6	4.9	59.8	25.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	71.2	21.6		27.5	13.4	5.6	47.9	24.6	4.9	59.8	25.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	C		C	B	A	D	C	A	E	C	
Approach Delay		33.7			15.5			16.0			45.4	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	77	96		74	53	24	49	32	0	64	60	
Queue Length 95th (ft)	#184	145		#161	68	39	#118	53	36	#131	120	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	205	1011		624	1234	842	185	846	1018	331	393	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.87	0.55		0.68	0.27	0.53	0.63	0.19	0.46	0.88	0.54	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 47 (67%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 24.5 Intersection LOS: C
Intersection Capacity Utilization 56.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 20: Ellis Ave & Golden State Blvd

ø1	ø2	ø3	ø4
13 s	20.9 s	14 s	22.1 s

ø5	ø6	ø8	ø7
11.4 s	22.5 s	24 s	12.1 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		1	1		2	2		0
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
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00
Frt		0.958				0.850			0.850		0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	3433	3539	1583	1597	3195	2515	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	3433	3539	1583	1597	3195	2515	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61				447			884		32	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	202	581	227	837	496	571	191	254	909	407	184	120
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	220	632	247	910	539	621	208	276	988	442	200	130
Lane Group Flow (vph)	220	879	0	910	539	621	208	276	988	442	330	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9	20.9	8.9	20.9	20.9	8.9	20.9	
Total Split (s)	19.1	26.6	0.0	27.0	34.5	34.5	15.5	21.0	21.0	15.4	20.9	0.0
Total Split (%)	21.2%	29.6%	0.0%	30.0%	38.3%	38.3%	17.2%	23.3%	23.3%	17.1%	23.2%	0.0%
Maximum Green (s)	14.2	21.7		22.1	29.6	29.6	10.6	16.1	16.1	10.5	16.0	
Yellow Time (s)	3.9	3.9		3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	14.4	22.6		23.0	31.2	31.2	11.5	15.6	15.6	12.8	16.9	
Actuated g/C Ratio	0.16	0.25		0.26	0.35	0.35	0.13	0.17	0.17	0.14	0.19	
v/c Ratio	0.78	0.98		1.04	0.44	0.74	1.02	0.50	0.85	0.91	0.93	
Control Delay	55.9	58.0		61.4	15.1	10.1	109.7	36.7	12.7	63.3	67.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	55.9	58.0		61.4	15.1	10.1	109.7	36.7	12.7	63.3	67.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	E		E	B	B	F	D	B	E	E	
Approach Delay		57.6			34.0			30.9			65.0	
Approach LOS		E			C			C			E	
Queue Length 50th (ft)	120	245		~287	95	70	~123	74	28	~134	170	
Queue Length 95th (ft)	#225	#376		m#373	m123	m90	#263	113	110	#232	#333	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	297	897		877	1227	841	204	604	1192	488	355	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.74	0.98		1.04	0.44	0.74	1.02	0.46	0.83	0.91	0.93	

Intersection Summary

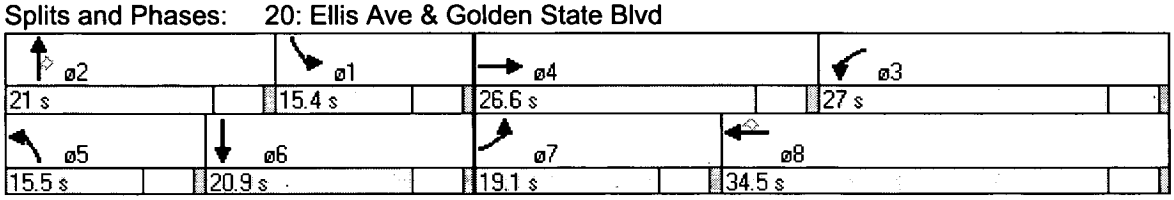
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 28 (31%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 42.4 Intersection LOS: D
Intersection Capacity Utilization 88.1% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



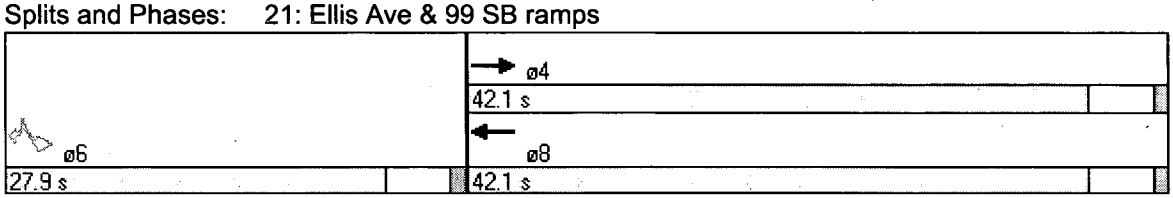
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	2		2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3505	0	0	3167	0	0	0	0	3303	0	2682
Flt Permitted										0.950		
Satd. Flow (perm)	0	3505	0	0	3167	0	0	0	0	3303	0	2682
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												330
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1069	0	0	673	0	0	0	0	350	0	429
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
Heavy Vehicles (%)	3%	3%	3%	14%	14%	14%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	1162	0	0	732	0	0	0	0	380	0	466
Lane Group Flow (vph)	0	1162	0	0	732	0	0	0	0	380	0	466
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	42.1	0.0	0.0	42.1	0.0	0.0	0.0	0.0	27.9	0.0	27.9
Total Split (%)	0.0%	60.1%	0.0%	0.0%	60.1%	0.0%	0.0%	0.0%	0.0%	39.9%	0.0%	39.9%
Maximum Green (s)		37.2			37.2					23.0		23.0
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		46.9			46.9					15.1		15.1
Actuated g/C Ratio		0.67			0.67					0.22		0.22
v/c Ratio		0.50			0.35					0.53		0.56
Control Delay		3.3			3.5					26.5		9.5
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		3.3			3.5					26.5		9.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			A					C		A
Approach Delay		3.3			3.5							
Approach LOS		A			A							
Queue Length 50th (ft)		38			0					74		27
Queue Length 95th (ft)		m48			136					102		62
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2347			2121					1128		1133
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.50			0.35					0.34		0.41

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 4 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 7.6 Intersection LOS: A
Intersection Capacity Utilization 59.9% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



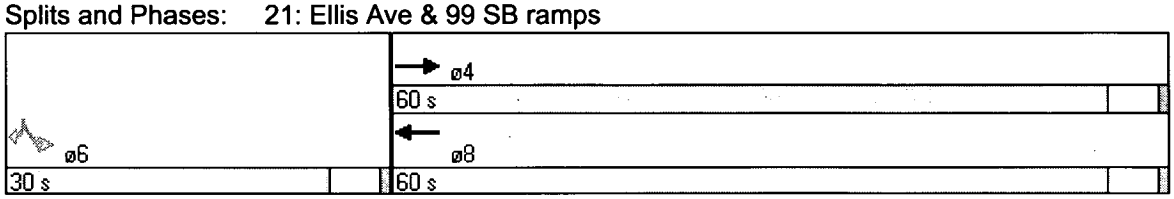
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	2		2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	3367	0	2733
Flt Permitted										0.950		
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	3367	0	2733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												146
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1897	0	0	1108	0	0	0	0	568	0	796
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	2062	0	0	1204	0	0	0	0	617	0	865
Lane Group Flow (vph)	0	2062	0	0	1204	0	0	0	0	617	0	865
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	60.0	0.0	0.0	60.0	0.0	0.0	0.0	0.0	30.0	0.0	30.0
Total Split (%)	0.0%	66.7%	0.0%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	33.3%
Maximum Green (s)		55.1			55.1					25.1		25.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		55.3			55.3					26.7		26.7
Actuated g/C Ratio		0.61			0.61					0.30		0.30
v/c Ratio		0.95			0.55					0.62		0.95
Control Delay		11.7			6.1					30.7		46.8
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		11.7			6.1					30.7		46.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B			A					C		D
Approach Delay		11.7			6.1							
Approach LOS		B			A							
Queue Length 50th (ft)		171			200					156		235
Queue Length 95th (ft)		m#223			m220					213		#377
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2202			2202					998		913
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.94			0.55					0.62		0.95

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 91.1% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



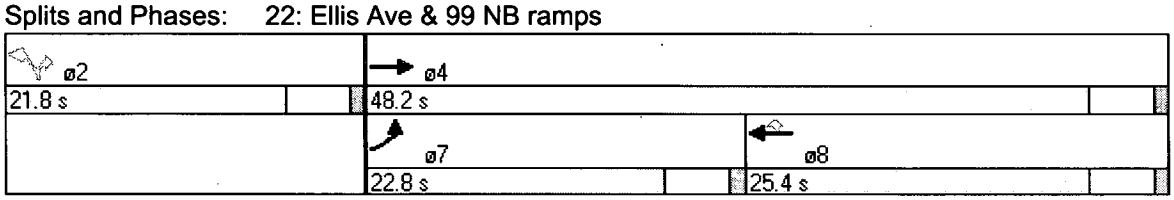
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3367	3471	0	0	3312	1482	3273	0	1509	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3367	3471	0	0	3312	1482	3273	0	1509	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						404			322			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	538	516	0	0	544	372	402	0	296	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	9%	9%	9%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	585	561	0	0	591	404	437	0	322	0	0	0
Lane Group Flow (vph)	585	561	0	0	591	404	437	0	322	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9	20.9	20.9		20.9			
Total Split (s)	22.8	48.2	0.0	0.0	25.4	25.4	21.8	0.0	21.8	0.0	0.0	0.0
Total Split (%)	32.6%	68.9%	0.0%	0.0%	36.3%	36.3%	31.1%	0.0%	31.1%	0.0%	0.0%	0.0%
Maximum Green (s)	17.9	43.3			20.5	20.5	16.9		16.9			
Yellow Time (s)	3.9	3.9			3.9	3.9	3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Min			C-Min	C-Min	None		None			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	17.8	46.6			24.9	24.9	15.4		15.4			
Actuated g/C Ratio	0.25	0.67			0.36	0.36	0.22		0.22			
v/c Ratio	0.68	0.24			0.50	0.51	0.61		0.55			
Control Delay	26.6	4.1			20.8	4.9	28.1		6.9			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	26.6	4.1			20.8	4.9	28.1		6.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C	A	C		A			
Approach Delay		15.6			14.3							
Approach LOS		B			B							
Queue Length 50th (ft)	100	30			112	0	87		0			
Queue Length 95th (ft)	151	47			161	58	125		57			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	922	2313			1176	787	832		624			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.63	0.24			0.50	0.51	0.53		0.52			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 40 (57%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 16.1 Intersection LOS: B
Intersection Capacity Utilization 59.9% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 22: Ellis Ave & 99 NB ramps



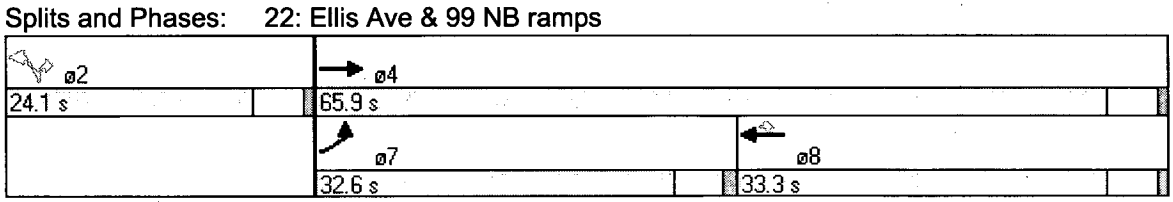
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3505	1568	3433	0	1583	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3505	1568	3433	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						453			193			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	970	837	0	0	978	580	614	0	455	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1054	910	0	0	1063	630	667	0	495	0	0	0
Lane Group Flow (vph)	1054	910	0	0	1063	630	667	0	495	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9	20.9	20.9		20.9			
Total Split (s)	32.6	65.9	0.0	0.0	33.3	33.3	24.1	0.0	24.1	0.0	0.0	0.0
Total Split (%)	36.2%	73.2%	0.0%	0.0%	37.0%	37.0%	26.8%	0.0%	26.8%	0.0%	0.0%	0.0%
Maximum Green (s)	27.7	61.0			28.4	28.4	19.2		19.2			
Yellow Time (s)	3.9	3.9			3.9	3.9	3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Min			C-Min	C-Min	None		None			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	28.6	61.9			29.3	29.3	20.1		20.1			
Actuated g/C Ratio	0.32	0.69			0.33	0.33	0.22		0.22			
v/c Ratio	0.97	0.37			0.93	0.77	0.87		0.98			
Control Delay	41.3	3.4			45.0	15.1	47.4		59.6			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	41.3	3.4			45.0	15.1	47.4		59.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			D	B	D		E			
Approach Delay		23.7			33.8							
Approach LOS		C			C							
Queue Length 50th (ft)	286	56			305	81	189		184			
Queue Length 95th (ft)	m#366	m83			#434	233	#282		#390			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	1091	2434			1141	816	767		503			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.97	0.37			0.93	0.77	0.87		0.98			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 61 (68%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 34.2 Intersection LOS: C
Intersection Capacity Utilization 91.1% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



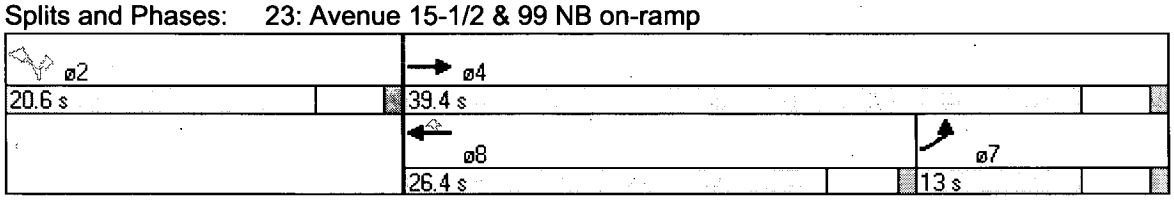
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		3	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	0.76	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	5085	0	0	4988	1553	3242	0	3409	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	5085	0	0	4988	1553	3242	0	3409	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						505			245			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	288	950	0	0	1299	465	386	0	468	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	313	1033	0	0	1412	505	420	0	509	0	0	0
Lane Group Flow (vph)	313	1033	0	0	1412	505	420	0	509	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	13.0	39.4	0.0	0.0	26.4	26.4	20.6	0.0	20.6	0.0	0.0	0.0
Total Split (%)	21.7%	65.7%	0.0%	0.0%	44.0%	44.0%	34.3%	0.0%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	34.8			21.8	21.8	16.0		16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	9.0	37.9			24.9	24.9	14.1		14.1			
Actuated g/C Ratio	0.15	0.63			0.42	0.42	0.24		0.24			
v/c Ratio	0.61	0.32			0.68	0.54	0.55		0.52			
Control Delay	31.4	3.9			17.0	4.0	22.6		11.5			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	31.4	3.9			17.0	4.0	22.6		11.5			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A	C		B			
Approach Delay		10.3			13.6							
Approach LOS		B			B							
Queue Length 50th (ft)	67	45			150	0	67		33			
Queue Length 95th (ft)	103	56			207	53	101		62			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	515	3212			2070	940	897		1120			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.61	0.32			0.68	0.54	0.47		0.45			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 62.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		3	0		0
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
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	0.76	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	5085	0	0	5085	1583	3400	0	3575	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	5085	0	0	5085	1583	3400	0	3575	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						689			17			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	469	2136	0	0	2072	784	794	0	810	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	510	2322	0	0	2252	852	863	0	880	0	0	0
Lane Group Flow (vph)	510	2322	0	0	2252	852	863	0	880	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	16.3	55.7	0.0	0.0	39.4	39.4	24.3	0.0	24.3	0.0	0.0	0.0
Total Split (%)	20.4%	69.6%	0.0%	0.0%	49.3%	49.3%	30.4%	0.0%	30.4%	0.0%	0.0%	0.0%
Maximum Green (s)	11.7	51.1			34.8	34.8	19.7		19.7			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	12.3	51.7			35.4	35.4	20.3		20.3			
Actuated g/C Ratio	0.15	0.65			0.44	0.44	0.25		0.25			
v/c Ratio	0.97	0.71			1.00	0.79	1.00		0.96			
Control Delay	56.5	1.6			42.7	9.9	62.4		51.3			
Queue Delay	0.0	0.3			0.0	0.0	0.0		0.0			
Total Delay	56.5	1.9			42.7	9.9	62.4		51.3			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			D	A	E		D			
Approach Delay		11.7			33.7							
Approach LOS		B			C							
Queue Length 50th (ft)	130	28			~398	49	~222		187			
Queue Length 95th (ft)	m#144	m26			#531	212	#346		#289			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	528	3286			2250	1085	863		920			
Starvation Cap Reductn	0	323			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.97	0.78			1.00	0.79	1.00		0.96			

Intersection Summary

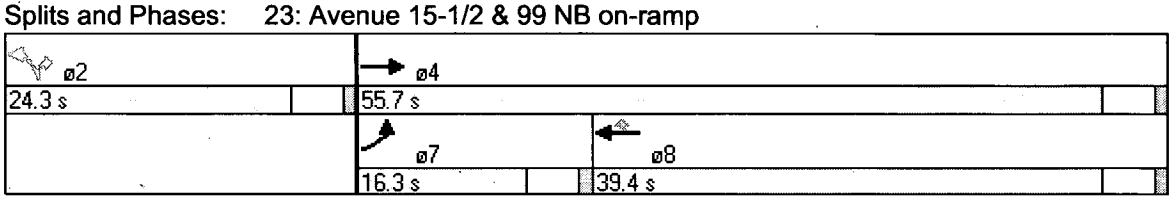
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 6 (8%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 30.8 Intersection LOS: C
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



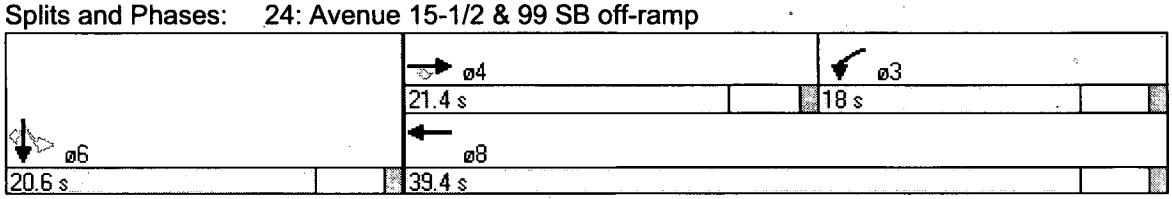
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	5085	1583	3367	4988	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	5085	1583	3367	4988	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			475									64
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	878	437	535	1150	0	0	0	0	360	1	233
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	954	475	582	1250	0	0	0	0	391	1	253
Lane Group Flow (vph)	0	954	475	582	1250	0	0	0	0	196	196	253
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	21.4	21.4	18.0	39.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	35.7%	35.7%	30.0%	65.7%	0.0%	0.0%	0.0%	0.0%	34.3%	34.3%	34.3%
Maximum Green (s)		16.8	16.8	13.4	34.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		21.0	21.0	14.0	39.0					13.0	13.0	13.0
Actuated g/C Ratio		0.35	0.35	0.23	0.65					0.22	0.22	0.22
v/c Ratio		0.54	0.55	0.74	0.39					0.54	0.54	0.64
Control Delay		17.8	4.8	17.9	1.0					25.7	25.6	23.1
Queue Delay		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Total Delay		17.8	4.8	17.9	1.0					25.7	25.6	23.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B	A	B	A					C	C	C
Approach Delay		13.5			6.4						24.6	
Approach LOS		B			A						C	
Queue Length 50th (ft)		100	0	107	0					65	65	60
Queue Length 95th (ft)		148	59	#130	19					114	114	118
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1780	863	786	3242					465	466	484
Starvation Cap Reductn		0	0	0	0					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.54	0.55	0.74	0.39					0.42	0.42	0.52

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 12.0 Intersection LOS: B
Intersection Capacity Utilization 62.3% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



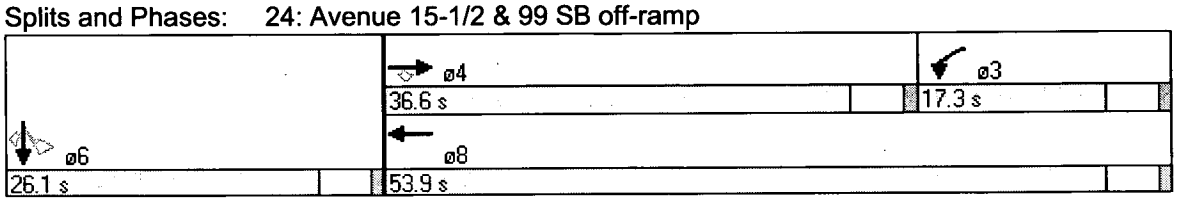
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.952	
Satd. Flow (prot)	0	5085	1583	3433	5085	0	0	0	0	1681	1685	1583
Flt Permitted				0.950						0.950	0.952	
Satd. Flow (perm)	0	5085	1583	3433	5085	0	0	0	0	1681	1685	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			688									3
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1824	828	487	2379	0	0	0	0	781	1	387
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1983	900	529	2586	0	0	0	0	849	1	421
Lane Group Flow (vph)	0	1983	900	529	2586	0	0	0	0	425	425	421
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	36.6	36.6	17.3	53.9	0.0	0.0	0.0	0.0	26.1	26.1	26.1
Total Split (%)	0.0%	45.8%	45.8%	21.6%	67.4%	0.0%	0.0%	0.0%	0.0%	32.6%	32.6%	32.6%
Maximum Green (s)		32.0	32.0	12.7	49.3					21.5	21.5	21.5
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		32.6	32.6	13.3	49.9					22.1	22.1	22.1
Actuated g/C Ratio		0.41	0.41	0.17	0.62					0.28	0.28	0.28
v/c Ratio		0.96	0.85	0.93	0.82					0.92	0.91	0.96
Control Delay		36.0	15.0	30.6	6.5					55.7	55.3	64.8
Queue Delay		0.0	0.0	0.0	0.7					0.0	0.0	0.0
Total Delay		36.0	15.0	30.6	7.3					55.7	55.3	64.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B	C	A					E	E	E
Approach Delay		29.4			11.2						58.6	
Approach LOS		C			B						E	
Queue Length 50th (ft)		342	76	124	145					215	215	205
Queue Length 95th (ft)		#460	#389	m124	m145					#394	#393	#385
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		2072	1053	571	3172					464	465	439
Starvation Cap Reductn		0	0	0	270					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.96	0.85	0.93	0.89					0.92	0.91	0.96

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 26.7 Intersection LOS: C
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



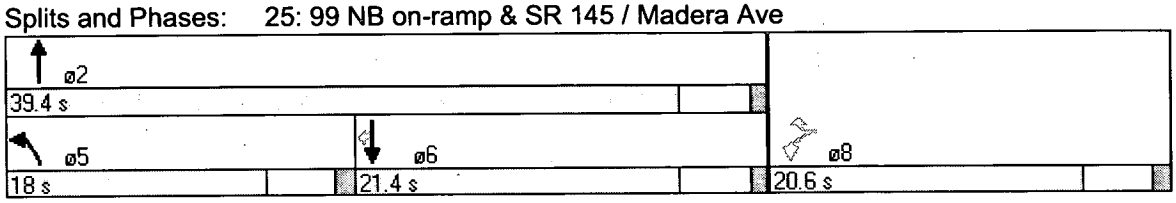
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.91	0.91
Frt						0.850					0.917	0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	3539	0	0	3109	1441
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	3539	0	0	3109	1441
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						53					356	357
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	678	0	49	685	759	0	0	268	656
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	737	0	53	745	825	0	0	291	713
Lane Group Flow (vph)	0	0	0	737	0	53	745	825	0	0	647	357
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	18.0	39.4	0.0	0.0	21.4	21.4
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	30.0%	65.7%	0.0%	0.0%	35.7%	35.7%
Maximum Green (s)				16.0		16.0	13.4	34.8			16.8	16.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				17.1		17.1	15.6	34.9			15.4	15.4
Actuated g/C Ratio				0.28		0.28	0.26	0.58			0.26	0.26
v/c Ratio				0.75		0.11	0.84	0.40			0.61	0.56
Control Delay				25.6		6.2	31.0	7.8			11.2	6.2
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				25.6		6.2	31.0	7.8			11.2	6.2
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								18.8			9.5	
Approach LOS								B			A	
Queue Length 50th (ft)				113		0	142	106			49	0
Queue Length 95th (ft)				#189		21	#240	134			89	58
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				1011		503	890	2122			1161	674
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.73		0.11	0.84	0.39			0.56	0.53

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 32 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 17.3 Intersection LOS: B
Intersection Capacity Utilization 63.3% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



Mitigated 2030 Project PM Alt B
25: 99 NB on-ramp & SR 145 / Madera Ave

9/13/2006

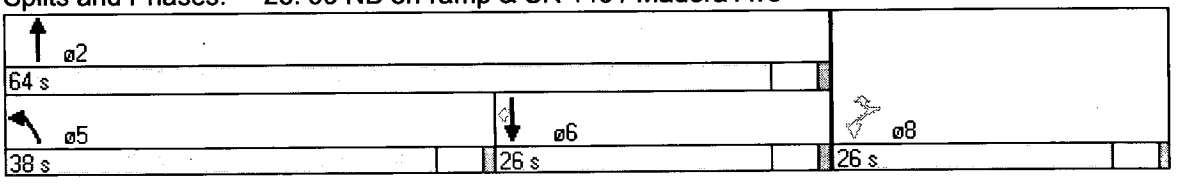
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.91	0.91
Frt						0.850					0.947	0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	3539	0	0	3211	1441
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	3539	0	0	3211	1441
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73					94	434
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	697	0	67	1108	1062	0	0	449	765
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	758	0	73	1204	1154	0	0	488	832
Lane Group Flow (vph)	0	0	0	758	0	73	1204	1154	0	0	752	568
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	26.0	0.0	26.0	38.0	64.0	0.0	0.0	26.0	26.0
Total Split (%)	0.0%	0.0%	0.0%	28.9%	0.0%	28.9%	42.2%	71.1%	0.0%	0.0%	28.9%	28.9%
Maximum Green (s)				21.4		21.4	33.4	59.4			21.4	21.4
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				21.7		21.7	34.1	60.3			22.2	22.2
Actuated g/C Ratio				0.24		0.24	0.38	0.67			0.25	0.25
v/c Ratio				0.91		0.17	0.93	0.49			0.87	0.83
Control Delay				50.4		7.9	23.4	2.4			41.0	20.4
Queue Delay				0.0		0.0	0.0	0.4			0.0	0.0
Total Delay				50.4		7.9	23.4	2.8			41.0	20.4
LOS				D		A	C	A			D	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								13.3			32.2	
Approach LOS								B			C	
Queue Length 50th (ft)				215		0	196	14			200	72
Queue Length 95th (ft)				#320		33	m#275	m15			#308	#293
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				839		442	1299	2369			863	682
Starvation Cap Reductn				0		0	0	619			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.90		0.17	0.93	0.66			0.87	0.83

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 5 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 25.0 Intersection LOS: C
Intersection Capacity Utilization 82.1% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



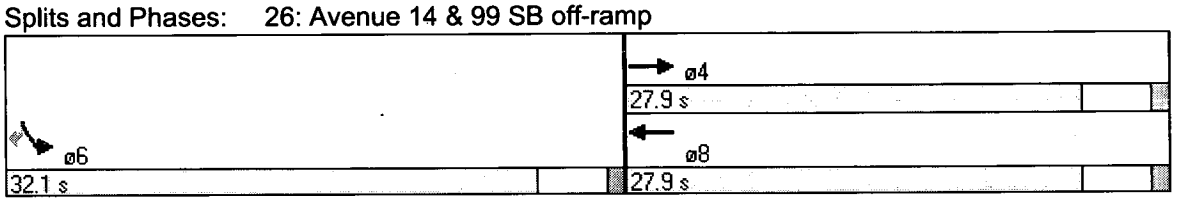
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	3539	0	3400	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	3400	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						80
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	792	719	0	804	369
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	861	782	0	874	401
Lane Group Flow (vph)	0	861	782	0	874	401
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	27.9	27.9	0.0	32.1	32.1
Total Split (%)	0.0%	46.5%	46.5%	0.0%	53.5%	53.5%
Maximum Green (s)		23.3	23.3		27.5	27.5
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		29.2	29.2		22.8	22.8
Actuated g/C Ratio		0.49	0.49		0.38	0.38
v/c Ratio		0.50	0.45		0.68	0.62
Control Delay		12.8	6.6		17.9	15.7
Queue Delay		0.0	0.9		0.0	0.0
Total Delay		12.8	7.5		17.9	15.7
LOS		B	A		B	B
Approach Delay		12.8	7.5		17.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		B	
Queue Length 50th (ft)		104	29		129	88
Queue Length 95th (ft)		178	85		156	142
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1725	1725		1592	777
Starvation Cap Reductn		0	615		0	0
Spillback Cap Reductn		48	0		15	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.51	0.70		0.55	0.52

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 6 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.3 Intersection LOS: B
Intersection Capacity Utilization 51.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



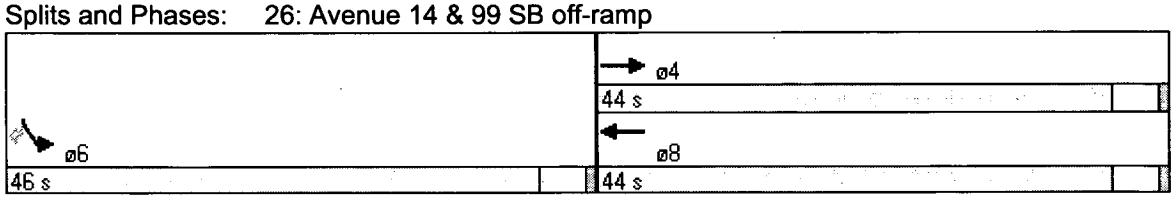
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	3539	0	3433	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	3433	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						87
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	1117	778	0	1153	308
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1214	846	0	1253	335
Lane Group Flow (vph)	0	1214	846	0	1253	335
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	44.0	44.0	0.0	46.0	46.0
Total Split (%)	0.0%	48.9%	48.9%	0.0%	51.1%	51.1%
Maximum Green (s)		39.4	39.4		41.4	41.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		42.9	42.9		39.1	39.1
Actuated g/C Ratio		0.48	0.48		0.43	0.43
v/c Ratio		0.72	0.50		0.84	0.46
Control Delay		22.6	5.4		28.5	14.5
Queue Delay		1.4	1.0		0.1	0.0
Total Delay		24.0	6.4		28.6	14.5
LOS		C	A		C	B
Approach Delay		24.0	6.4		25.6	
Approach LOS		C	A		C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		297	58		296	87
Queue Length 95th (ft)		380	76		381	155
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1689	1689		1602	785
Starvation Cap Reductn		0	537		0	0
Spillback Cap Reductn		275	0		31	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.86	0.73		0.80	0.43

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 44 (49%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 20.6 Intersection LOS: C
Intersection Capacity Utilization 70.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



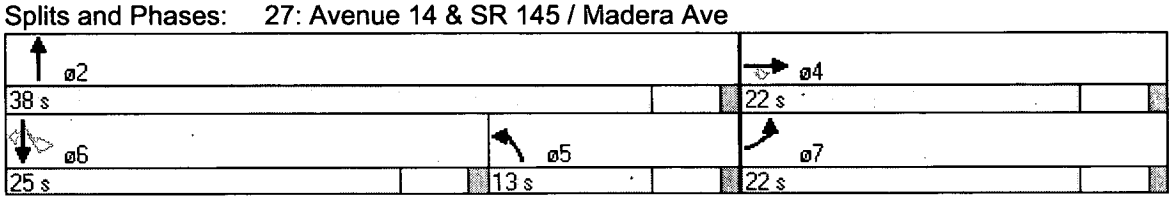
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		2	0		0	2		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50		50	50	50
Trailing Detector (ft)	0	0	0				0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	0.88	1.00	1.00	1.00	0.97	0.91	0.91	1.00	0.95	1.00
Frt			0.850					0.988				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3335	3438	2707	0	0	0	3400	4975	0	1752	3505	1568
Flt Permitted	0.950						0.950			0.190		
Satd. Flow (perm)	3335	3438	2707	0	0	0	3400	4975	0	350	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			748					38				458
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	383	363	850	0	0	0	298	1061	90	40	485	421
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	416	395	924	0	0	0	324	1153	98	43	527	458
Lane Group Flow (vph)	416	395	924	0	0	0	324	1251	0	43	527	458
Turn Type	Prot		Perm				Prot			Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4							6		6
Detector Phases	7	4	4				5	2		6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6		20.6	20.6	20.6
Total Split (s)	22.0	22.0	22.0	0.0	0.0	0.0	13.0	38.0	0.0	25.0	25.0	25.0
Total Split (%)	36.7%	36.7%	36.7%	0.0%	0.0%	0.0%	21.7%	63.3%	0.0%	41.7%	41.7%	41.7%
Maximum Green (s)	17.4	17.4	17.4				8.4	33.4		20.4	20.4	20.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0		1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min		C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0		0	0	0
Act Effct Green (s)	14.7	14.7	14.7				9.2	37.3		24.1	24.1	24.1
Actuated g/C Ratio	0.24	0.24	0.24				0.15	0.62		0.40	0.40	0.40
v/c Ratio	0.51	0.47	0.75				0.62	0.40		0.30	0.37	0.51
Control Delay	19.8	19.2	8.7				29.7	6.6		7.8	4.1	2.1
Queue Delay	3.4	2.9	1.1				0.0	0.0		0.0	0.0	0.2
Total Delay	23.2	22.2	9.9				29.7	6.6		7.8	4.1	2.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	A				C	A		A	A	A
Approach Delay		15.9						11.3			3.4	
Approach LOS		B						B			A	
Queue Length 50th (ft)	50	47	31				57	81		4	24	1
Queue Length 95th (ft)	85	83	75				93	109		m6	m37	m9
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250					
Base Capacity (vph)	1001	1031	1336				526	3109		141	1410	905
Starvation Cap Reductn	477	513	201				0	0		0	0	0
Spillback Cap Reductn	0	0	0				0	0		0	0	68
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.79	0.76	0.81				0.62	0.40		0.30	0.37	0.55

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 11.3 Intersection LOS: B
Intersection Capacity Utilization 49.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



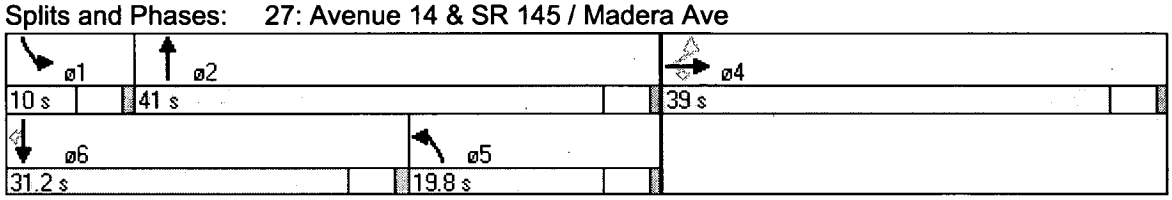
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		2	0		0	2		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50		50	50	50
Trailing Detector (ft)	0	0	0				0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	0.88	1.00	1.00	1.00	0.97	0.91	0.91	1.00	0.95	1.00
Frt			0.850					0.992				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3367	3471	2733	0	0	0	3433	5045	0	1770	3539	1583
Flt Permitted	0.950						0.950			0.950		
Satd. Flow (perm)	3367	3471	2733	0	0	0	3433	5045	0	1770	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			840					12				475
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	470	547	1253	0	0	0	341	1700	96	82	627	437
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	511	595	1362	0	0	0	371	1848	104	89	682	475
Lane Group Flow (vph)	511	595	1362	0	0	0	371	1952	0	89	682	475
Turn Type	Perm		Perm				Prot			Prot		Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4									6
Detector Phases	4	4	4				5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6		8.6	20.6	20.6
Total Split (s)	39.0	39.0	39.0	0.0	0.0	0.0	19.8	41.0	0.0	10.0	31.2	31.2
Total Split (%)	43.3%	43.3%	43.3%	0.0%	0.0%	0.0%	22.0%	45.6%	0.0%	11.1%	34.7%	34.7%
Maximum Green (s)	34.4	34.4	34.4				15.2	36.4		5.4	26.6	26.6
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0		1.0	1.0	1.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max				None	Min		None	Min	Min
Walk Time (s)	5.0	5.0	5.0					5.0			5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0			0	0
Act Effct Green (s)	36.6	36.6	36.6				15.3	37.4		6.0	26.0	26.0
Actuated g/C Ratio	0.41	0.41	0.41				0.17	0.42		0.07	0.29	0.29
v/c Ratio	0.37	0.42	0.85				0.63	0.93		0.75	0.67	0.60
Control Delay	18.0	18.5	12.6				40.0	34.4		63.0	10.4	4.6
Queue Delay	13.1	30.5	20.9				0.0	0.0		0.0	0.0	0.5
Total Delay	31.1	48.9	33.4				40.0	34.4		63.0	10.4	5.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D	C				D	C		E	B	A
Approach Delay		36.7						35.3			12.1	
Approach LOS		D						D			B	
Queue Length 50th (ft)	91	108	131				101	378		47	84	34
Queue Length 95th (ft)	m126	m153	217				147	#494		m54	m95	m42
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250					
Base Capacity (vph)	1370	1412	1610				603	2102		118	1070	810
Starvation Cap Reductn	836	838	290				0	0		0	0	0
Spillback Cap Reductn	0	0	0				0	0		0	0	85
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.96	1.04	1.03				0.62	0.93		0.75	0.64	0.66

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (98%), Referenced to phase 4:EBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 31.1 Intersection LOS: C
Intersection Capacity Utilization 67.8% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	Mitigated 2030 Project AM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	412			316	225
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	71	468	0	0	359	255
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						250
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	284
Percent Heavy Vehicles	0	0	0	0	0	25
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (veh/h)	71							284
C (m) (veh/h)	758							625
v/c	0.09							0.45
95% queue length	0.31							2.37
Control Delay (s/veh)	10.2							15.5
LOS	B							C
Approach Delay (s/veh)	–	–				15.5		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/31/2006 9:30 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	Mitigated 2030 Project PM		

Project Description 04-837.1 Alternative B

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	588			461	263
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	668	0	0	523	298
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						280
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	318
Percent Heavy Vehicles	0	0	0	0	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (veh/h)	82							318
C (m) (veh/h)	628							574
v/c	0.13							0.55
95% queue length	0.45							3.37
Control Delay (s/veh)	11.6							18.8
LOS	B							C
Approach Delay (s/veh)	–	–				18.8		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/31/2006 9:30 AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.916			0.896				0.850		0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1611	0	2398	1166	0	1504	1583	1346	1008	1048	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1611	0	2398	1166	0	1504	1583	1346	1008	1048	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			131				269		5	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1597			696			822			681	
Travel Time (s)		31.1			13.6			18.7			15.5	
Volume (vph)	5	40	51	454	51	115	29	78	237	111	45	4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	46%	46%	46%	20%	20%	20%	79%	79%	79%
Adj. Flow (vph)	6	45	58	516	58	131	33	89	269	126	51	5
Lane Group Flow (vph)	6	103	0	516	189	0	33	89	269	126	56	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.6	20.6		8.6	20.6		8.6	20.6	20.6	8.6	20.6	
Total Split (s)	8.6	22.2	0.0	22.2	35.8	0.0	10.6	20.6	20.6	15.0	25.0	0.0
Total Split (%)	10.8%	27.8%	0.0%	27.8%	44.8%	0.0%	13.3%	25.8%	25.8%	18.8%	31.3%	0.0%
Maximum Green (s)	4.0	17.6		17.6	31.2		6.0	16.0	16.0	10.4	20.4	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	6.0	20.4		22.0	44.6		6.5	10.6	10.6	11.0	21.4	
Actuated g/C Ratio	0.08	0.26		0.28	0.56		0.08	0.13	0.13	0.14	0.27	
v/c Ratio	0.05	0.23		0.78	0.27		0.27	0.42	0.65	0.91	0.20	
Control Delay	35.8	14.3		33.3	3.8		40.5	36.9	12.2	93.1	24.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	35.8	14.3		33.3	3.8		40.5	36.9	12.2	93.1	24.1	
LOS	D	B		C	A		D	D	B	F	C	
Approach Delay		15.5			25.4			20.2			71.8	

J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			C			E	
90th %ile Green (s)	4.5	17.6		18.1	31.2		6.0	15.5	15.5	10.4	19.9	
90th %ile Term Code	Max	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
70th %ile Green (s)	0.0	17.6		22.4	44.6		6.0	11.2	11.2	10.4	15.6	
70th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
50th %ile Green (s)	0.0	17.6		24.0	46.2		0.0	9.6	9.6	10.4	24.6	
50th %ile Term Code	Skip	Coord		Max	Coord		Skip	Gap	Gap	Max	Hold	
30th %ile Green (s)	0.0	19.7		23.5	47.8		0.0	8.0	8.0	10.4	23.0	
30th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
10th %ile Green (s)	0.0	26.3		19.1	50.0		0.0	5.8	5.8	10.4	20.8	
10th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
Queue Length 50th (ft)	3	18		108	1		16	42	0	63	18	
Queue Length 95th (ft)	14	55		#214	59		42	77	57	#159	49	
Internal Link Dist (ft)		1517			616			742			601	
Turn Bay Length (ft)												
Base Capacity (vph)	125	453		660	707		124	328	492	139	298	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.05	0.23		0.78	0.27		0.27	0.27	0.55	0.91	0.19	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 44 (55%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.2 Intersection LOS: C
Intersection Capacity Utilization 39.1% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 29: Avenue 18 1/2 & Golden State Blvd

ø1	ø2	ø3	ø4
15 s	20.6 s	22.2 s	22.2 s

ø5	ø6	ø7	ø8
10.6 s	25 s	8.6 s	35.8 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.931			0.916				0.850		0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1734	0	3433	1706	0	1770	1863	1583	1770	1840	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1734	0	3433	1706	0	1770	1863	1583	1770	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		57			104				443		6	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1597			696			822			681	
Travel Time (s)		31.1			13.6			18.7			15.5	
Volume (vph)	12	90	76	582	100	127	41	89	390	127	62	5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	14	102	86	661	114	144	47	101	443	144	70	6
Lane Group Flow (vph)	14	188	0	661	258	0	47	101	443	144	76	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.6	20.6		8.6	20.6		8.6	20.6	20.6	8.6	20.6	
Total Split (s)	8.6	21.0	0.0	18.0	30.4	0.0	10.1	20.6	20.6	10.4	20.9	0.0
Total Split (%)	12.3%	30.0%	0.0%	25.7%	43.4%	0.0%	14.4%	29.4%	29.4%	14.9%	29.9%	0.0%
Maximum Green (s)	4.0	16.4		13.4	25.8		5.5	16.0	16.0	5.8	16.3	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	4.6	18.7		18.4	39.4		6.1	10.5	10.5	6.4	14.8	
Actuated g/C Ratio	0.07	0.27		0.26	0.56		0.09	0.15	0.15	0.09	0.21	
v/c Ratio	0.12	0.37		0.73	0.26		0.31	0.36	0.72	0.89	0.19	
Control Delay	33.3	17.7		27.4	6.0		35.6	29.0	10.3	82.3	23.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	33.3	17.7		27.4	6.0		35.6	29.0	10.3	82.3	23.2	
LOS	C	B		C	A		D	C	B	F	C	
Approach Delay		18.8			21.4			15.5			61.9	
Approach LOS		B			C			B			E	

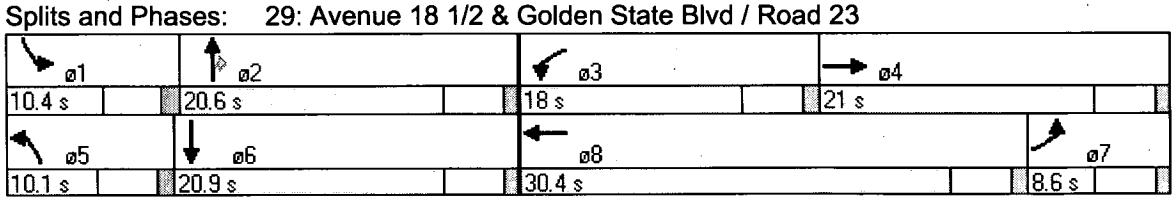
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	4.0	16.4		13.4	25.8		5.5	16.0	16.0	5.8	16.3	
90th %ile Term Code	Max	Coord		Max	Coord		Max	Max	Max	Max	Hold	
70th %ile Green (s)	0.0	16.4		18.2	39.2		5.5	11.2	11.2	5.8	11.5	
70th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
50th %ile Green (s)	0.0	16.4		20.5	41.5		5.5	8.9	8.9	5.8	9.2	
50th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
30th %ile Green (s)	0.0	18.1		20.1	42.8		0.0	7.6	7.6	5.8	18.0	
30th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
10th %ile Green (s)	0.0	23.2		16.9	44.7		0.0	5.7	5.7	5.8	16.1	
10th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
Queue Length 50th (ft)	6	46		100	15		19	40	0	63	27	
Queue Length 95th (ft)	22	97		#236	m99		49	71	61	#157	54	
Internal Link Dist (ft)		1517			616			742			601	
Turn Bay Length (ft)												
Base Capacity (vph)	116	505		903	1006		154	442	713	162	458	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.12	0.37		0.73	0.26		0.31	0.23	0.62	0.89	0.17	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 44 (63%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 23.9 Intersection LOS: C
Intersection Capacity Utilization 50.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 29: Avenue 18 1/2 & Golden State Blvd / Road 23



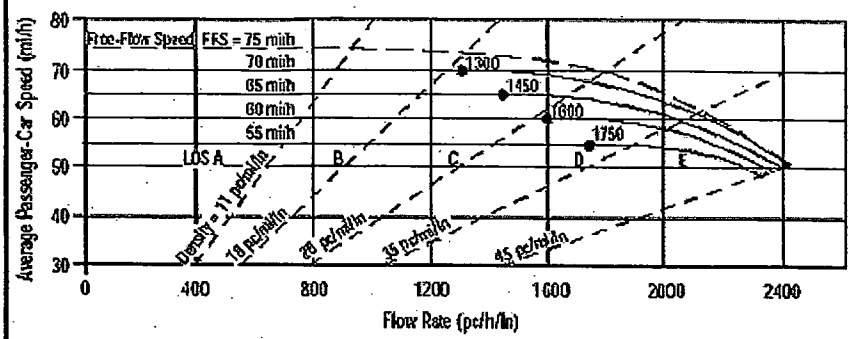
ATTACHMENT VI – C - 39

MITIGATED 2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

FREEWAY LEVEL OF SERVICE CALCULATIONS

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2030 Project AM*

Site Information

Highway/Direction of Travel	*SR 99 Northbound*
From/To	*North of Avenue 18 1/2*
Jurisdiction	*Caltrans*
Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4272*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1305*	pc/h/ln
S	*70.0*	mi/h
D = v_p / S	*18.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

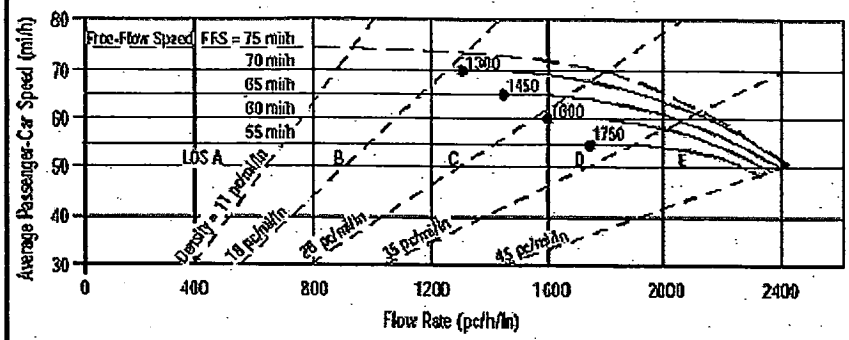
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4421*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

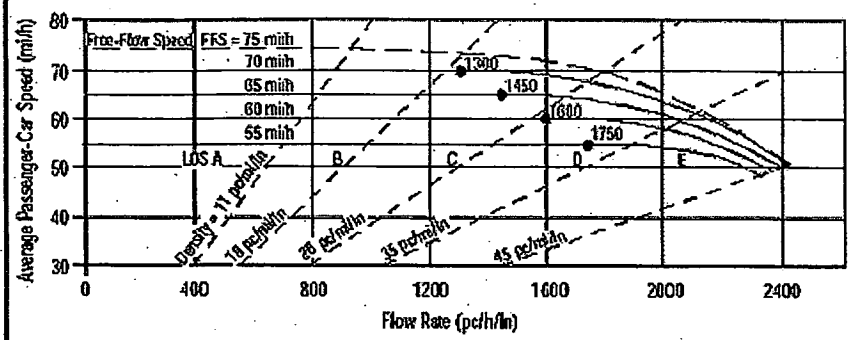
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1350*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*19.3*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/16/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3521*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

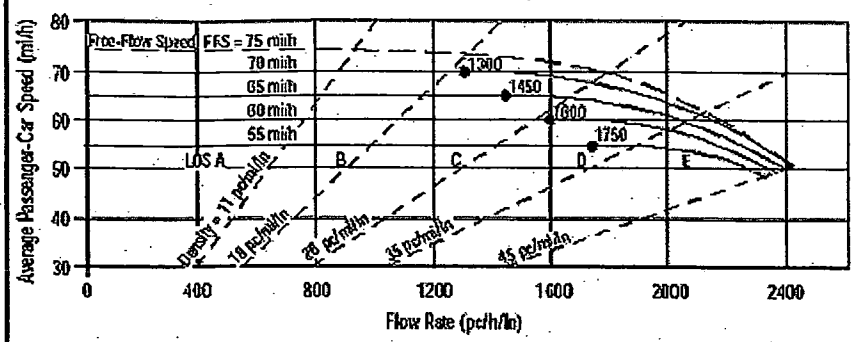
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1075*	pc/h/ln	Design LOS	
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*15.4*	pc/mi/ln	S	mi/h
LOS	*B*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*North of Avenue 18 1/2*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5354*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1635*	pc/h/ln
S	*69.2*	mi/h
D = v_p / S	*23.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

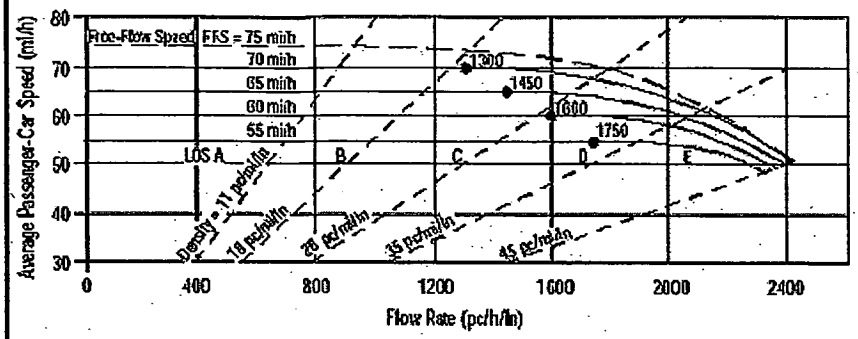
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4635*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

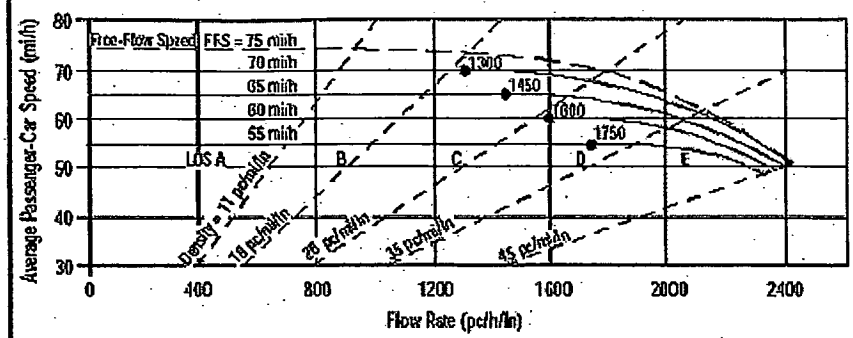
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1416*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*20.2*	pc/mi/ln	S		mi/h
LOS	*C*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4699*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

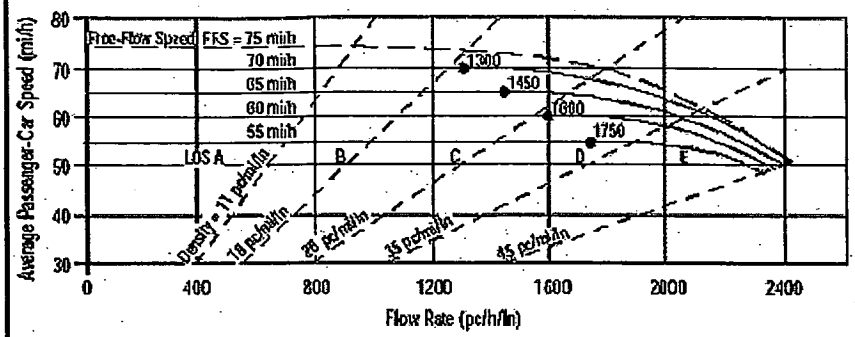
LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1435*	pc/h/ln	Design LOS	
S	*69.9*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
D = v_p / S	*20.5*	pc/mi/ln	S	mi/h
LOS	*C*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*between Ave 18 1/2 & Ave 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3793*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

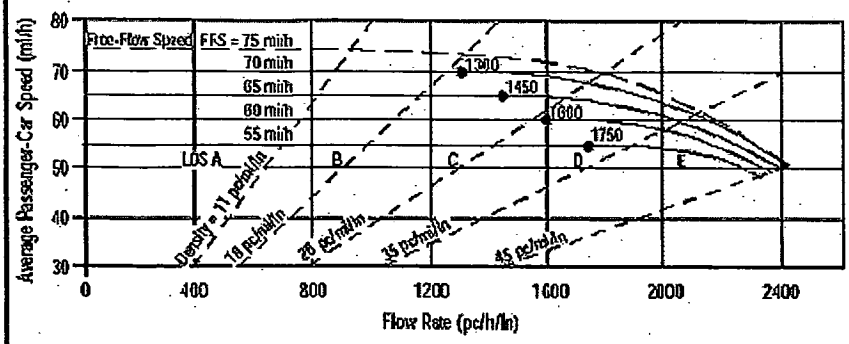
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1159*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*16.6*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	*S. Leon*
Agency or Company	*TPG Consulting, Inc.*
Date Performed	*7/19/06*
Analysis Time Period	*Mitigated 2030 Project PM*

Site Information

Highway/Direction of Travel	*SR 99 Southbound*
From/To	*between Ave 18 1/2 & Ave 17*
Jurisdiction	*Caltrans*
Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5733*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1751*	pc/h/ln
S	*68.4*	mi/h
D = v_p / S	*25.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

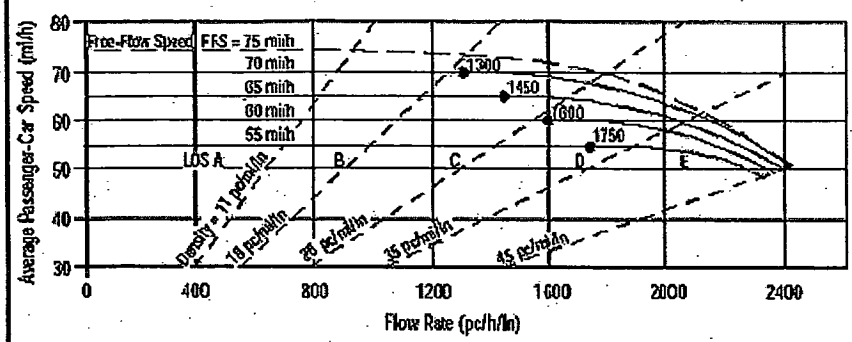
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project AM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5310*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1622*	pc/h/ln
S	*69.3*	mi/h
D = v_p / S	*23.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

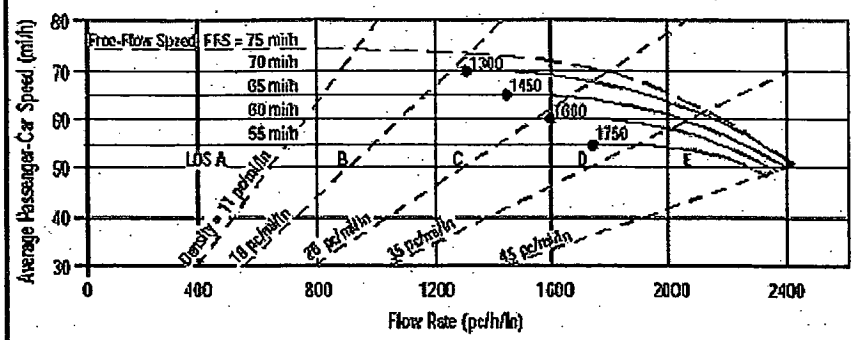
N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Northbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*Mitigated 2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6412*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

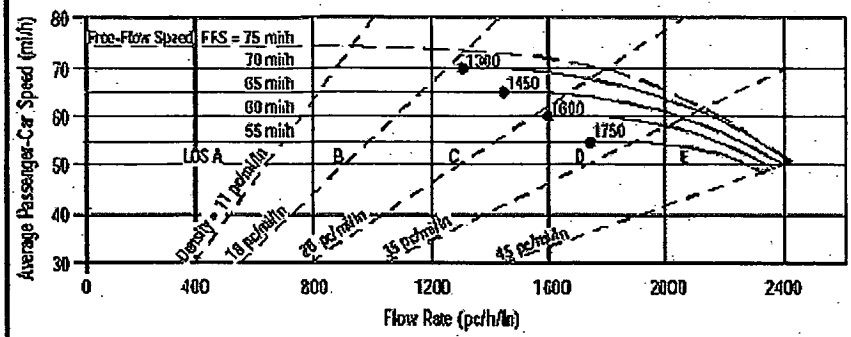
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1958*	pc/h/ln	Design LOS		
S	*65.6*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*29.8*	pc/mi/ln	S		mi/h
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information / Site Information

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period		Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☑ Planning Data

Flow Inputs

Volume, V	*4124*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft	f_{LW}		mi/h
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}		mi/h
Interchange Density	*0.50*	I/mi	f_{ID}		mi/h
Number of Lanes, N	*4*		f_N		mi/h
FFS (measured)	*70.0*	mi/h	FFS	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h			

LOS and Performance Measures / Design (N)

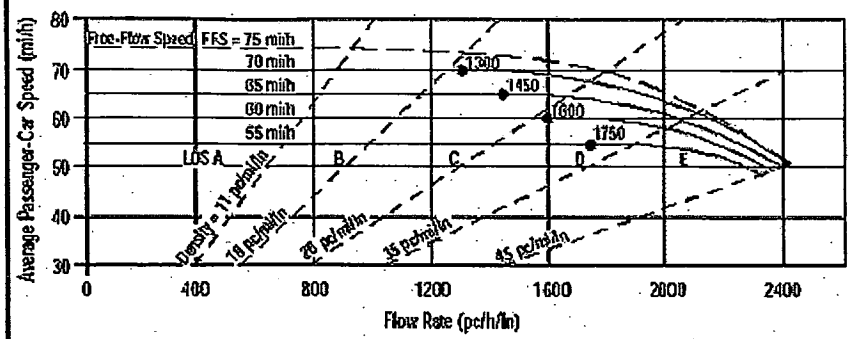
LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1260*	pc/h/ln	Design LOS		
S	*70.0*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
D = v_p / S	*18.0*	pc/mi/ln	S		mi/h
LOS	*B*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

Copyright © 2005 University of Florida, All Rights Reserved

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	*S. Leon*	Highway/Direction of Travel	*SR 99 Southbound*
Agency or Company	*TPG Consulting, Inc.*	From/To	*south of Avenue 17*
Date Performed	*7/19/06*	Jurisdiction	*Caltrans*
Analysis Time Period	*2030 Project PM*	Analysis Year	*2030*

Project Description 04-837.1 Northfork Casino Alt C

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7134*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*2*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.890*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Shoulder Lat. Clearance	*6.0*	ft
Interchange Density	*0.50*	I/mi
Number of Lanes, N	*4*	
FFS (measured)	*70.0*	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	*70.0*	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2179*	pc/h/ln
S	*60.7*	mi/h
D = v_p / S	*35.9*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 40

MITIGATED 2030 PROJECT CONDITIONS

MADERA SITE - ALTERNATIVE C

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	2798	2959	0	1318	1179
Flt Permitted					0.950	
Satd. Flow (perm)	0	2798	2959	0	1318	1179
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						299
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	513	298	0	34	263
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	583	339	0	39	299
Lane Group Flow (vph)	0	583	339	0	39	299
Turn Type						custom
Protected Phases		4	8			
Permitted Phases					6	6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.9	20.9		20.9	20.9
Total Split (s)	0.0	38.4	38.4	0.0	41.6	41.6
Total Split (%)	0.0%	48.0%	48.0%	0.0%	52.0%	52.0%
Maximum Green (s)		33.8	33.8		37.0	37.0
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Max	Max
Act Effct Green (s)		34.4	34.4		37.6	37.6
Actuated g/C Ratio		0.43	0.43		0.47	0.47
v/c Ratio		0.48	0.27		0.06	0.42
Control Delay		13.2	3.7		12.0	3.7
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		13.2	3.7		12.0	3.7
LOS		B	A		B	A
Approach Delay		13.2	3.7		4.6	
Approach LOS		B	A		A	
90th %ile Green (s)		33.8	33.8		37.0	37.0
90th %ile Term Code		Coord	Coord		MaxR	MaxR

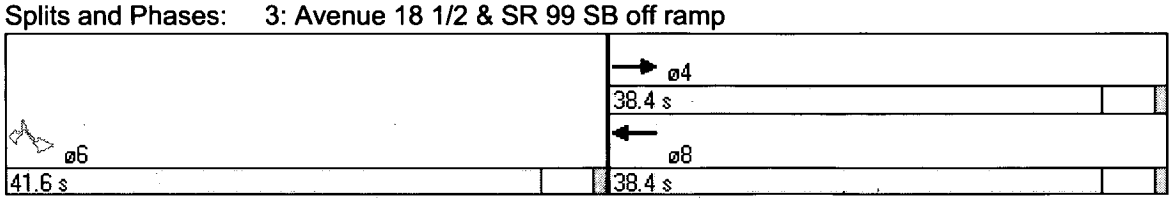
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		33.8	33.8		37.0	37.0
70th %ile Term Code		Coord	Coord		MaxR	MaxR
50th %ile Green (s)		33.8	33.8		37.0	37.0
50th %ile Term Code		Coord	Coord		MaxR	MaxR
30th %ile Green (s)		33.8	33.8		37.0	37.0
30th %ile Term Code		Coord	Coord		MaxR	MaxR
10th %ile Green (s)		33.8	33.8		37.0	37.0
10th %ile Term Code		Coord	Coord		MaxR	MaxR
Queue Length 50th (ft)		84	7		10	0
Queue Length 95th (ft)		m92	m6		26	38
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		1203	1272		619	713
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.48	0.27		0.06	0.42

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 77 (96%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 8.4 Intersection LOS: A
Intersection Capacity Utilization 42.9% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	2798	2959	0	1318	1179
Flt Permitted					0.950	
Satd. Flow (perm)	0	2798	2959	0	1318	1179
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						314
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		285	942		3472	
Travel Time (s)		5.6	18.4		78.9	
Volume (vph)	0	702	351	0	65	439
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	29%	29%	22%	22%	37%	37%
Adj. Flow (vph)	0	798	399	0	74	499
Lane Group Flow (vph)	0	798	399	0	74	499
Turn Type						custom
Protected Phases		4	8			
Permitted Phases					6	6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.9	20.9		20.9	20.9
Total Split (s)	0.0	37.2	37.2	0.0	42.8	42.8
Total Split (%)	0.0%	46.5%	46.5%	0.0%	53.5%	53.5%
Maximum Green (s)		32.6	32.6		38.2	38.2
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Max	Max
Act Effct Green (s)		33.2	33.2		38.8	38.8
Actuated g/C Ratio		0.42	0.42		0.48	0.48
v/c Ratio		0.69	0.32		0.12	0.68
Control Delay		18.2	5.4		11.9	11.0
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		18.2	5.4		11.9	11.0
LOS		B	A		B	B
Approach Delay		18.2	5.4		11.1	
Approach LOS		B	A		B	
90th %ile Green (s)		32.6	32.6		38.2	38.2
90th %ile Term Code		Coord	Coord		MaxR	MaxR

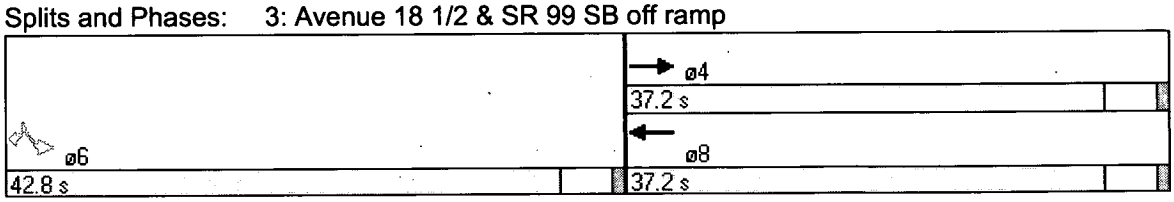
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
70th %ile Green (s)		32.6	32.6		38.2	38.2
70th %ile Term Code		Coord	Coord		MaxR	MaxR
50th %ile Green (s)		32.6	32.6		38.2	38.2
50th %ile Term Code		Coord	Coord		MaxR	MaxR
30th %ile Green (s)		32.6	32.6		38.2	38.2
30th %ile Term Code		Coord	Coord		MaxR	MaxR
10th %ile Green (s)		32.6	32.6		38.2	38.2
10th %ile Term Code		Coord	Coord		MaxR	MaxR
Queue Length 50th (ft)		139	38		19	56
Queue Length 95th (ft)		165	m49		41	159
Internal Link Dist (ft)		205	862		3392	
Turn Bay Length (ft)						
Base Capacity (vph)		1161	1228		639	734
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.69	0.32		0.12	0.68

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 4 (5%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 53.2% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Avenue 18 1/2 & SR 99 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	2		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.956				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	2366	2439	0	0	3166	0	0	1337	1196	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	2366	2439	0	0	3166	0	0	1337	1196	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					55				19			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	265	86	0	0	116	48	243	0	36	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	48%	48%	48%	9%	9%	9%	35%	35%	35%	2%	2%	2%
Adj. Flow (vph)	301	98	0	0	132	55	276	0	41	0	0	0
Lane Group Flow (vph)	301	98	0	0	187	0	0	276	41	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	31.0	53.0	0.0	0.0	22.0	0.0	27.0	27.0	27.0	0.0	0.0	0.0
Total Split (%)	38.8%	66.3%	0.0%	0.0%	27.5%	0.0%	33.8%	33.8%	33.8%	0.0%	0.0%	0.0%
Maximum Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lag				Lead							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	27.0	51.8			20.8			20.2	20.2			
Actuated g/C Ratio	0.34	0.65			0.26			0.25	0.25			
v/c Ratio	0.38	0.06			0.22			0.82	0.13			
Control Delay	6.9	1.3			18.1			48.0	14.9			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	6.9	1.3			18.1			48.0	14.9			

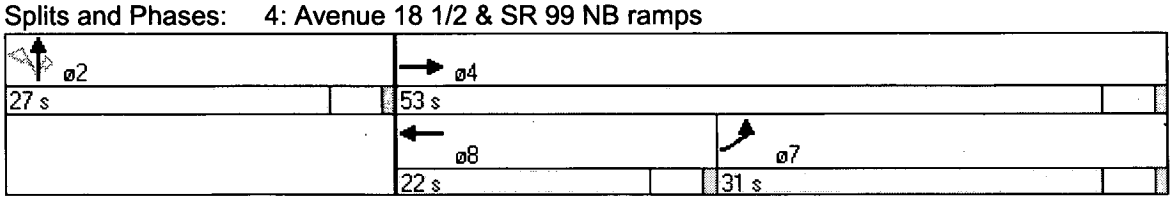
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A			B			D	B			
Approach Delay		5.5			18.1			43.7				
Approach LOS		A			B			D				
90th %ile Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
90th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	26.4	48.4			17.4		22.4	22.4	22.4			
70th %ile Term Code	Hold	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	26.4	49.1			18.1		21.7	21.7	21.7			
50th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
30th %ile Green (s)	26.4	52.6			21.6		18.2	18.2	18.2			
30th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	26.4	57.6			26.6		13.2	13.2	13.2			
10th %ile Term Code	Hold	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	21	1			27			125	8			
Queue Length 95th (ft)	30	3			53			#224	30			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	799	1580			865			384	357			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.38	0.06			0.22			0.72	0.11			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 21.6 Intersection LOS: C
Intersection Capacity Utilization 35.8% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		25	0		0
Storage Lanes	2		0	0		0	0		1	0		0
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
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.974				0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	2870	2959	0	0	3058	0	0	1504	1346	0	0	0
Flt Permitted	0.950							0.950				
Satd. Flow (perm)	2870	2959	0	0	3058	0	0	1504	1346	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28				34			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		942			784			2752			2800	
Travel Time (s)		18.4			15.3			62.5			63.6	
Volume (vph)	392	124	0	0	172	35	281	0	78	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	22%	22%	22%	15%	15%	15%	20%	20%	20%	45%	45%	45%
Adj. Flow (vph)	445	141	0	0	195	40	319	0	89	0	0	0
Lane Group Flow (vph)	445	141	0	0	235	0	0	319	89	0	0	0
Turn Type	Prot						Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases							2		2			
Detector Phases	7	4			8		2	2	2			
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Minimum Split (s)	8.9	20.9			20.9		20.9	20.9	20.9			
Total Split (s)	33.0	55.0	0.0	0.0	22.0	0.0	25.0	25.0	25.0	0.0	0.0	0.0
Total Split (%)	41.3%	68.8%	0.0%	0.0%	27.5%	0.0%	31.3%	31.3%	31.3%	0.0%	0.0%	0.0%
Maximum Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
Yellow Time (s)	3.6	3.6			3.6		3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		5.0			5.0		5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	25.3	52.3			22.9			19.7	19.7			
Actuated g/C Ratio	0.32	0.65			0.29			0.25	0.25			
v/c Ratio	0.49	0.07			0.26			0.86	0.25			
Control Delay	13.3	0.5			22.5			52.1	17.6			
Queue Delay	0.0	0.0			0.0			0.0	0.0			
Total Delay	13.3	0.5			22.5			52.1	17.6			

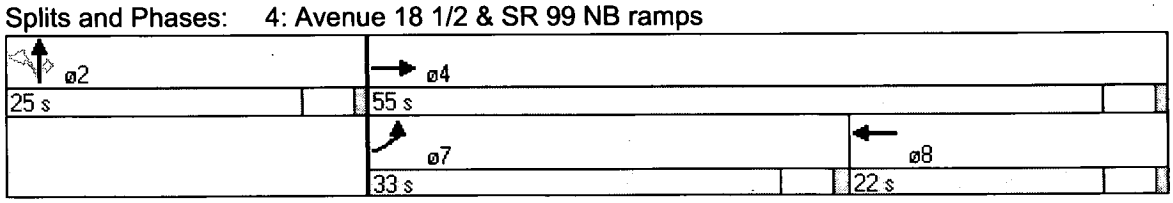
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	A			C			D	B			
Approach Delay		10.2			22.5			44.6				
Approach LOS		B			C			D				
90th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
90th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
70th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
70th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
50th %ile Green (s)	28.4	50.4			17.4		20.4	20.4	20.4			
50th %ile Term Code	Max	Coord			Coord		Max	Max	Max			
30th %ile Green (s)	25.7	51.2			20.9		19.6	19.6	19.6			
30th %ile Term Code	Gap	Coord			Coord		Gap	Gap	Gap			
10th %ile Green (s)	12.8	56.0			38.6		14.8	14.8	14.8			
10th %ile Term Code	Gap	Coord			Coord		Gap	Gap	Gap			
Queue Length 50th (ft)	18	1			45			149	21			
Queue Length 95th (ft)	36	m1			75			#271	56			
Internal Link Dist (ft)		862			704			2672			2720	
Turn Bay Length (ft)	150								25			
Base Capacity (vph)	1040	1933			897			395	378			
Starvation Cap Reductn	0	0			0			0	0			
Spillback Cap Reductn	0	0			0			0	0			
Storage Cap Reductn	0	0			0			0	0			
Reduced v/c Ratio	0.43	0.07			0.26			0.81	0.24			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 52 (65%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 24.0 Intersection LOS: C
Intersection Capacity Utilization 43.6% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Avenue 18 1/2 & SR 99 NB ramps



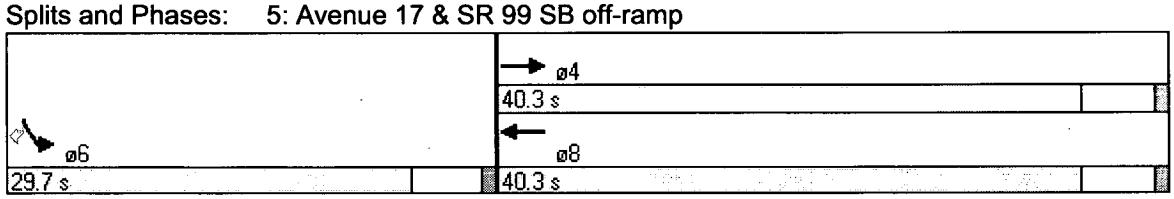
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↖↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	4848	5036	0	3303	1524
Flt Permitted					0.950	
Satd. Flow (perm)	0	4848	5036	0	3303	1524
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						14
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	1516	1454	0	155	244
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	3%	3%	6%	6%
Adj. Flow (vph)	0	1723	1652	0	176	277
Lane Group Flow (vph)	0	1723	1652	0	176	277
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	40.3	40.3	0.0	29.7	29.7
Total Split (%)	0.0%	57.6%	57.6%	0.0%	42.4%	42.4%
Maximum Green (s)		35.0	35.0		24.4	24.4
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		43.9	43.9		18.1	18.1
Actuated g/C Ratio		0.63	0.63		0.26	0.26
v/c Ratio		0.57	0.52		0.21	0.69
Control Delay		2.4	4.2		19.4	30.3
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		2.4	4.2		19.4	30.3
LOS		A	A		B	C
Approach Delay		2.4	4.2		26.1	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)		21	30		30	103
Queue Length 95th (ft)		46	146		44	146
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		3042	3160		1213	568
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.57	0.52		0.15	0.49

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 55 (79%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 6.0 Intersection LOS: A
Intersection Capacity Utilization 52.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↖↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	4988	4803	0	3242	1495
Flt Permitted					0.950	
Satd. Flow (perm)	0	4988	4803	0	3242	1495
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						4
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45	45		30	
Link Distance (ft)		488	1034		704	
Travel Time (s)		7.4	15.7		16.0	
Volume (vph)	0	2987	2360	0	334	347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	8%	8%	8%	8%
Adj. Flow (vph)	0	3394	2682	0	380	394
Lane Group Flow (vph)	0	3394	2682	0	380	394
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		21.3	21.3		21.3	21.3
Total Split (s)	0.0	85.0	85.0	0.0	35.0	35.0
Total Split (%)	0.0%	70.8%	70.8%	0.0%	29.2%	29.2%
Maximum Green (s)		79.7	79.7		29.7	29.7
Yellow Time (s)		4.3	4.3		4.3	4.3
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		81.0	81.0		31.0	31.0
Actuated g/C Ratio		0.68	0.68		0.26	0.26
v/c Ratio		1.01	0.83		0.45	1.01
Control Delay		18.8	9.1		39.5	93.1
Queue Delay		0.0	0.1		0.0	0.0
Total Delay		18.8	9.2		39.5	93.1
LOS		B	A		D	F
Approach Delay		18.8	9.2		66.8	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		E	
Queue Length 50th (ft)		~443	426		127	~311
Queue Length 95th (ft)		#484	m328		171	#499
Internal Link Dist (ft)		408	954		624	
Turn Bay Length (ft)						
Base Capacity (vph)		3367	3242		838	389
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	69		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.01	0.85		0.45	1.01

Intersection Summary

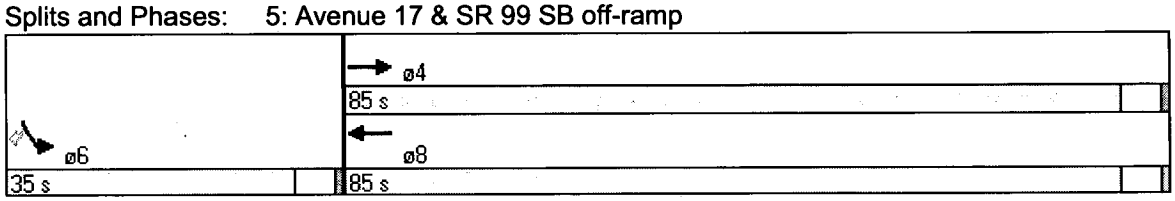
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 82 (68%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 20.5 Intersection LOS: C
Intersection Capacity Utilization 77.4% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Avenue 17 & SR 99 SB off-ramp



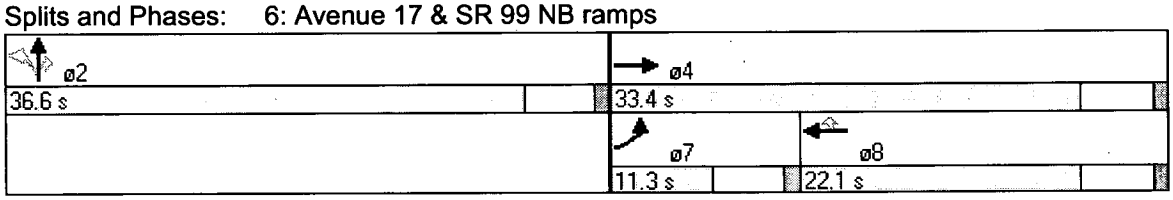
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.91	0.91	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.957				
Satd. Flow (prot)	3400	5036	0	0	5085	1583	3221	1622	2787	0	0	0
Flt Permitted	0.950						0.950	0.957				
Satd. Flow (perm)	3400	5036	0	0	5085	1583	3221	1622	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						81			434			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	146	415	0	0	780	71	1190	47	382	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	166	472	0	0	886	81	1352	53	434	0	0	0
Lane Group Flow (vph)	166	472	0	0	886	81	921	484	434	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	11.3	33.4	0.0	0.0	22.1	22.1	36.6	36.6	36.6	0.0	0.0	0.0
Total Split (%)	16.1%	47.7%	0.0%	0.0%	31.6%	31.6%	52.3%	52.3%	52.3%	0.0%	0.0%	0.0%
Maximum Green (s)	6.0	28.1			16.8	16.8	31.3	31.3	31.3			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	7.7	32.4			20.7	20.7	29.6	29.6	29.6			
Actuated g/C Ratio	0.11	0.46			0.30	0.30	0.42	0.42	0.42			
v/c Ratio	0.44	0.20			0.59	0.15	0.68	0.71	0.30			
Control Delay	33.1	4.8			23.8	6.4	18.8	22.5	1.9			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	33.1	4.8			23.8	6.4	18.8	22.5	1.9			
LOS	C	A			C	A	B	C	A			
Approach Delay		12.2			22.3			15.8				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			B				
Queue Length 50th (ft)	33	31			125	0	154	165	0			
Queue Length 95th (ft)	59	44			161	28	207	263	21			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	376	2334			1504	525	1500	755	1530			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.44	0.20			0.59	0.15	0.61	0.64	0.28			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 26 (37%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 16.9 Intersection LOS: B
Intersection Capacity Utilization 52.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.91	0.91	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	3433	5085	0	0	5085	1583	3221	1615	2787	0	0	0
Flt Permitted	0.950						0.950	0.953				
Satd. Flow (perm)	3433	5085	0	0	5085	1583	3221	1615	2787	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						220			43			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1034			1061			1077			1349	
Travel Time (s)		15.7			16.1			24.5			30.7	
Volume (vph)	220	1024	0	0	1399	236	1843	5	1379	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	250	1164	0	0	1590	268	2094	6	1567	0	0	0
Lane Group Flow (vph)	250	1164	0	0	1590	268	1396	704	1567	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	9.3	21.3			21.3	21.3	21.3	21.3	21.3			
Total Split (s)	13.0	54.0	0.0	0.0	41.0	41.0	66.0	66.0	66.0	0.0	0.0	0.0
Total Split (%)	10.8%	45.0%	0.0%	0.0%	34.2%	34.2%	55.0%	55.0%	55.0%	0.0%	0.0%	0.0%
Maximum Green (s)	7.7	48.7			35.7	35.7	60.7	60.7	60.7			
Yellow Time (s)	4.3	4.3			4.3	4.3	4.3	4.3	4.3			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	9.0	50.0			37.0	37.0	62.0	62.0	62.0			
Actuated g/C Ratio	0.08	0.42			0.31	0.31	0.52	0.52	0.52			
v/c Ratio	0.97	0.55			1.01	0.42	0.84	0.84	1.07			
Control Delay	74.8	21.0			67.6	9.2	30.5	36.1	74.1			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	74.8	21.0			67.6	9.2	30.5	36.1	74.1			
LOS	E	C			E	A	C	D	E			
Approach Delay		30.5			59.2			50.2				
Approach LOS		C			E			D				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	98	193			~462	27	489	495	~757			
Queue Length 95th (ft)	m#103	m194			#549	90	575	678	#875			
Internal Link Dist (ft)		954			981			997			1269	
Turn Bay Length (ft)												
Base Capacity (vph)	257	2119			1568	640	1664	834	1461			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.97	0.55			1.01	0.42	0.84	0.84	1.07			

Intersection Summary

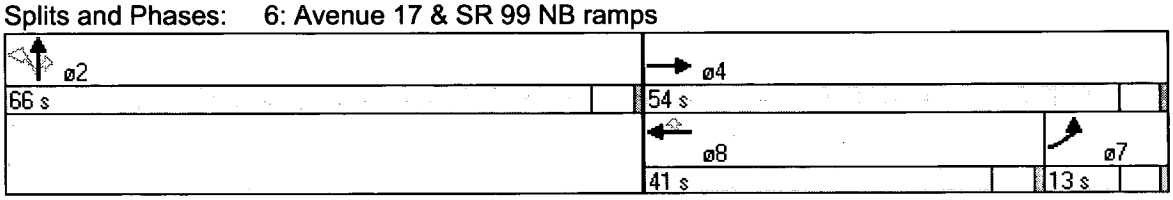
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 111 (93%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 48.6 Intersection LOS: D
Intersection Capacity Utilization 77.4% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Avenue 17 & SR 99 NB ramps



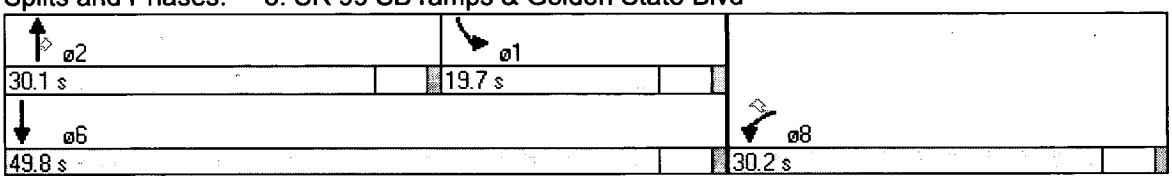
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	0.97	1.00	1.00	1.00	0.97	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3155	1455	1863	1583	3433	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3155	1455	1863	1583	3433	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		340		462		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	537	299	89	407	276	87
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	11%	11%	2%	2%	2%	2%
Adj. Flow (vph)	610	340	101	462	314	99
Lane Group Flow (vph)	610	340	101	462	314	99
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6	20.6	8.6	20.6
Total Split (s)	30.2	30.2	30.1	30.1	19.7	49.8
Total Split (%)	37.8%	37.8%	37.6%	37.6%	24.6%	62.3%
Maximum Green (s)	25.6	25.6	25.5	25.5	15.1	45.2
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	22.5	22.5	32.5	32.5	13.0	49.5
Actuated g/C Ratio	0.28	0.28	0.41	0.41	0.16	0.62
v/c Ratio	0.69	0.52	0.13	0.50	0.56	0.09
Control Delay	29.1	5.3	12.1	4.9	34.6	8.0
Queue Delay	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	29.1	5.3	12.1	5.2	34.6	8.0
LOS	C	A	B	A	C	A
Approach Delay	20.6		6.4			28.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	C		A			C
Queue Length 50th (ft)	140	0	15	4	75	18
Queue Length 95th (ft)	158	46	m32	64	106	47
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	1072	719	784	934	682	1175
Starvation Cap Reductn	0	0	0	136	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.47	0.13	0.58	0.46	0.08

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 18.1 Intersection LOS: B
Intersection Capacity Utilization 39.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



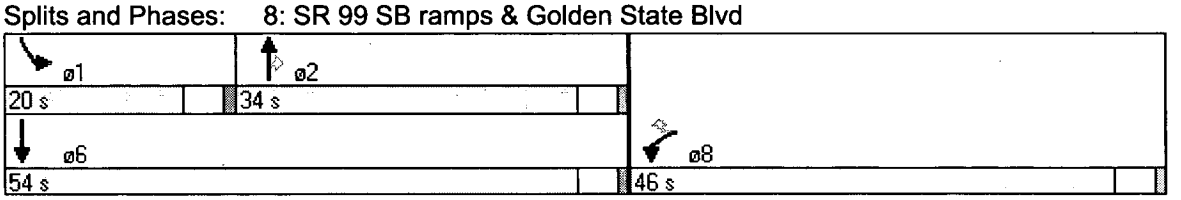
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	0.97	1.00	1.00	1.00	0.97	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3335	1538	1863	1583	3183	1727
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3335	1538	1863	1583	3183	1727
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		733		636		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30		30			30
Link Distance (ft)	220		316			764
Travel Time (s)	5.0		7.2			17.4
Volume (vph)	959	778	143	560	350	131
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	2%	2%	10%	10%
Adj. Flow (vph)	1090	884	162	636	398	149
Lane Group Flow (vph)	1090	884	162	636	398	149
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6	20.6	8.6	20.6
Total Split (s)	46.0	46.0	34.0	34.0	20.0	54.0
Total Split (%)	46.0%	46.0%	34.0%	34.0%	20.0%	54.0%
Maximum Green (s)	41.4	41.4	29.4	29.4	15.4	49.4
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	44.2	44.2	27.6	27.6	16.3	47.8
Actuated g/C Ratio	0.44	0.44	0.28	0.28	0.16	0.48
v/c Ratio	0.74	0.81	0.32	0.71	0.77	0.18
Control Delay	26.4	10.8	14.5	11.2	51.1	17.0
Queue Delay	0.2	0.0	0.0	4.3	0.0	0.0
Total Delay	26.6	10.8	14.5	15.5	51.1	17.0
LOS	C	B	B	B	D	B
Approach Delay	19.5		15.3			41.8

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Approach LOS	B		B			D
Queue Length 50th (ft)	268	54	49	159	122	56
Queue Length 95th (ft)	355	229	m48	m177	#185	88
Internal Link Dist (ft)	140		236			684
Turn Bay Length (ft)						
Base Capacity (vph)	1535	1103	599	941	532	896
Starvation Cap Reductn	0	0	0	226	0	0
Spillback Cap Reductn	58	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.80	0.27	0.89	0.75	0.17

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 4 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 62.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: SR 99 SB ramps & Golden State Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	2		1	1		1	1		2	2		1
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
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3183	3282	1468	1703	3406	1524	1612	1696	2538	3335	1810	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3183	3282	1468	1703	3406	1524	1612	1696	2538	3335	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			26			267			441			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	242	296	24	113	446	246	70	8	406	529	18	77
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
Heavy Vehicles (%)	10%	10%	10%	6%	6%	6%	12%	12%	12%	5%	5%	5%
Adj. Flow (vph)	263	322	26	123	485	267	76	9	441	575	20	84
Lane Group Flow (vph)	263	322	26	123	485	267	76	9	441	575	20	84
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	14.0	23.5	23.5	12.9	22.4	22.4	13.8	20.6	20.6	23.0	29.8	29.8
Total Split (%)	17.5%	29.4%	29.4%	16.1%	28.0%	28.0%	17.3%	25.8%	25.8%	28.8%	37.3%	37.3%
Maximum Green (s)	9.4	18.9	18.9	8.3	17.8	17.8	9.2	16.0	16.0	18.4	25.2	25.2
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	11.0	26.9	26.9	8.9	24.8	24.8	8.7	8.1	8.1	20.1	21.5	21.5
Actuated g/C Ratio	0.14	0.34	0.34	0.11	0.31	0.31	0.11	0.10	0.10	0.25	0.27	0.27
v/c Ratio	0.60	0.29	0.05	0.65	0.46	0.41	0.43	0.05	0.68	0.69	0.04	0.18
Control Delay	38.8	22.2	9.8	42.7	18.2	7.5	40.9	31.0	9.1	12.9	8.6	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	38.8	22.2	9.8	42.7	18.2	7.5	40.9	31.0	9.1	13.2	8.6	1.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	A	D	B	A	D	C	A	B	A	A
Approach Delay		28.8			18.4			14.1			11.6	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	62	61	0	63	116	41	36	4	0	23	2	0
Queue Length 95th (ft)	#104	108	19	m#119	174	m115	77	16	42	61	m5	m1
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	446	1103	511	189	1056	657	197	352	876	889	584	553
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	50	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.29	0.05	0.65	0.46	0.41	0.39	0.03	0.50	0.69	0.03	0.15

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 8 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 18.2 Intersection LOS: B
Intersection Capacity Utilization 51.0% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

ø2	ø1	ø4	ø3
20.6 s	23 s	23.5 s	12.9 s

ø5	ø6	ø7	ø8
13.8 s	29.8 s	14 s	22.4 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	0		0
Storage Lanes	2		1	1		1	1		2	2		1
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
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3273	3374	1509	1703	3406	1524	1687	1776	2656	3273	1776	1509
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3273	3374	1509	1703	3406	1524	1687	1776	2656	3273	1776	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			15			283			438			71
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		739			850			451			316	
Travel Time (s)		14.4			16.6			10.3			7.2	
Volume (vph)	420	409	14	138	652	260	149	23	466	1013	12	65
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
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Adj. Flow (vph)	457	445	15	150	709	283	162	25	507	1101	13	71
Lane Group Flow (vph)	457	445	15	150	709	283	162	25	507	1101	13	71
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6	8.6	20.6	20.6
Total Split (s)	18.0	27.1	27.1	16.3	25.4	25.4	22.1	20.6	20.6	36.0	34.5	34.5
Total Split (%)	18.0%	27.1%	27.1%	16.3%	25.4%	25.4%	22.1%	20.6%	20.6%	36.0%	34.5%	34.5%
Maximum Green (s)	13.4	22.5	22.5	11.7	20.8	20.8	17.5	16.0	16.0	31.4	29.9	29.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	14.0	23.1	23.1	12.3	21.4	21.4	41.2	10.2	10.2	38.4	7.4	7.4
Actuated g/C Ratio	0.14	0.23	0.23	0.12	0.21	0.21	0.41	0.10	0.10	0.38	0.07	0.07
v/c Ratio	1.00	0.57	0.04	0.72	0.97	0.52	0.23	0.14	0.76	0.88	0.10	0.40
Control Delay	85.7	37.4	14.2	54.9	53.8	6.4	20.8	40.0	15.2	24.4	57.6	34.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	85.7	37.4	14.2	54.9	53.8	6.4	20.8	40.0	15.2	25.9	57.6	34.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	D	B	D	D	A	C	D	B	C	E	C
Approach Delay		61.1			42.2			17.4			26.8	
Approach LOS		E			D			B			C	
Queue Length 50th (ft)	152	132	0	99	244	31	65	15	23	164	9	18
Queue Length 95th (ft)	#255	184	17	m#184	#364	61	120	37	75	#505	m14	m40
Internal Link Dist (ft)		659			770			371			236	
Turn Bay Length (ft)	200			200			200					
Base Capacity (vph)	458	779	360	209	729	549	695	295	806	1256	542	510
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	53	0	0
Spillback Cap Reductn	0	0	0	0	0	6	0	40	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.57	0.04	0.72	0.97	0.52	0.23	0.10	0.63	0.92	0.02	0.14

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 74 (74%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 37.6 Intersection LOS: D
Intersection Capacity Utilization 75.6% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Avenue 12 & Golden State Blvd

ø2	ø1	ø4	ø3
20.6 s	36 s	27.1 s	16.3 s

ø6	ø5	ø8	ø7
34.5 s	22.1 s	25.4 s	18 s

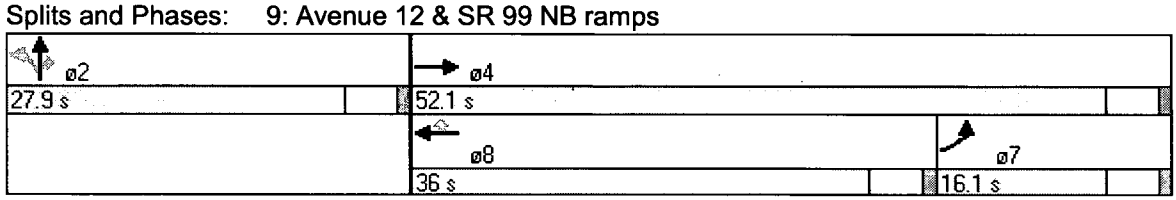
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		2	0		2	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1752	3505	0	0	3471	2733	0	1618	2538	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1752	3505	0	0	3471	2733	0	1618	2538	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						1222			112			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	106	1125	0	0	559	1075	245	11	409	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	12%	12%	12%	2%	2%	2%
Adj. Flow (vph)	120	1278	0	0	635	1222	278	12	465	0	0	0
Lane Group Flow (vph)	120	1278	0	0	635	1222	0	290	465	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	16.1	52.1	0.0	0.0	36.0	36.0	27.9	27.9	27.9	0.0	0.0	0.0
Total Split (%)	20.1%	65.1%	0.0%	0.0%	45.0%	45.0%	34.9%	34.9%	34.9%	0.0%	0.0%	0.0%
Maximum Green (s)	11.5	47.5			31.4	31.4	23.3	23.3	23.3			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	11.1	52.5			39.6	39.6		19.5	19.5			
Actuated g/C Ratio	0.14	0.66			0.50	0.50		0.24	0.24			
v/c Ratio	0.49	0.56			0.37	0.62		0.73	0.66			
Control Delay	31.9	4.1			15.4	2.7		38.8	24.6			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	31.9	4.1			15.4	2.7		38.8	24.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A		D	C			
Approach Delay		6.5			7.0			30.0				
Approach LOS		A			A			C				
Queue Length 50th (ft)	60	47			108	0		133	89			
Queue Length 95th (ft)	m87	91			160	34		198	128			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	265	2299			1718	1970		483	837			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.45	0.56			0.37	0.62		0.60	0.56			

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 58 (73%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 67.6% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



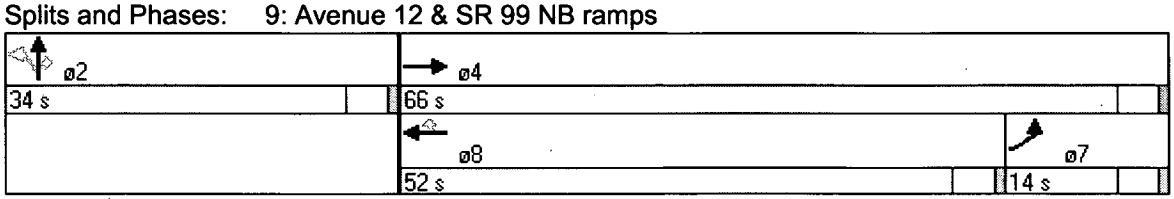
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	0		0
Storage Lanes	1		0	0		2	0		2	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1719	3438	0	0	3438	2707	0	1661	2608	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1719	3438	0	0	3438	2707	0	1661	2608	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						1508			23			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		850			323			737			1329	
Travel Time (s)		16.6			6.3			16.8			30.2	
Volume (vph)	126	1760	0	0	759	1577	292	3	658	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	143	2000	0	0	862	1792	332	3	748	0	0	0
Lane Group Flow (vph)	143	2000	0	0	862	1792	0	335	748	0	0	0
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2	2	2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6	20.6	20.6			
Total Split (s)	14.0	66.0	0.0	0.0	52.0	52.0	34.0	34.0	34.0	0.0	0.0	0.0
Total Split (%)	14.0%	66.0%	0.0%	0.0%	52.0%	52.0%	34.0%	34.0%	34.0%	0.0%	0.0%	0.0%
Maximum Green (s)	9.4	61.4			47.4	47.4	29.4	29.4	29.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6	3.6	3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		5.0			5.0	5.0	5.0	5.0	5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	10.0	62.3			48.3	48.3		29.7	29.7			
Actuated g/C Ratio	0.10	0.62			0.48	0.48		0.30	0.30			
v/c Ratio	0.83	0.93			0.52	0.86		0.68	0.94			
Control Delay	61.4	14.8			19.3	8.6		38.9	55.1			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	61.4	14.8			19.3	8.6		38.9	55.1			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	B			B	A		D	E			
Approach Delay		17.9			12.1			50.1				
Approach LOS		B			B			D				
Queue Length 50th (ft)	92	524			193	57		186	255			
Queue Length 95th (ft)	m#133	#607			242	156		278	#371			
Internal Link Dist (ft)		770			243			657			1249	
Turn Bay Length (ft)	200											
Base Capacity (vph)	172	2141			1659	2087		498	799			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.83	0.93			0.52	0.86		0.67	0.94			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 46 (46%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 88.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Avenue 12 & SR 99 NB ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.909			0.894						0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1693	0	1770	1665	0	1770	1863	0	1770	1852	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1693	0	1770	1665	0	1770	1863	0	1770	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			50						4	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		41.0			42.4			36.1			35.9	
Volume (vph)	15	8	13	2	19	46	18	300	1	53	289	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	9	14	2	21	50	20	326	1	58	314	14
Lane Group Flow (vph)	16	23	0	2	71	0	20	327	0	58	328	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	24.0	0.0	10.4	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	36.9%	0.0%	16.0%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	18.7		5.1	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.1	9.3		6.1	9.4		6.1	47.5		7.5	50.6	
Actuated g/C Ratio	0.09	0.13		0.09	0.14		0.09	0.75		0.11	0.80	
v/c Ratio	0.10	0.10		0.01	0.26		0.13	0.23		0.30	0.22	
Control Delay	23.7	13.0		23.0	11.2		23.9	7.9		23.4	6.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.7	13.0		23.0	11.2		23.9	7.9		23.4	6.0	
LOS	C	B		C	B		C	A		C	A	
Approach Delay		17.4			11.6			8.8			8.6	
Approach LOS		B			B			A			A	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	2	1		0	3		3	0		8	0	
Queue Length 95th (ft)	21	19		6	35		24	155		49	149	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	153	431		153	451		153	1405		191	1487	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.10	0.05		0.01	0.16		0.13	0.23		0.30	0.22	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 63
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 9.4 Intersection LOS: A
Intersection Capacity Utilization 36.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 13: Avenue 18 & Road 23

ø2	ø1	ø3	ø4
24 s	10.4 s	9.3 s	21.3 s

ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.932			0.864			0.998			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1736	0	1770	1609	0	1770	1859	0	1770	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1736	0	1770	1609	0	1770	1859	0	1770	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			122			1			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		2704			2800			2384			2368	
Travel Time (s)		41.0			42.4			36.1			35.9	
Volume (vph)	12	11	9	3	12	112	25	444	5	96	457	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	12	10	3	13	122	27	483	5	104	497	11
Lane Group Flow (vph)	13	22	0	3	135	0	27	488	0	104	508	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	24.4	0.0	10.0	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	37.5%	0.0%	15.4%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.1		4.7	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.7	9.2		5.7	9.2		5.7	31.9		6.7	39.8	
Actuated g/C Ratio	0.09	0.15		0.09	0.15		0.09	0.54		0.11	0.67	
v/c Ratio	0.09	0.08		0.02	0.39		0.18	0.49		0.54	0.41	
Control Delay	25.4	14.8		24.3	9.0		27.1	14.1		33.4	9.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.4	14.8		24.3	9.0		27.1	14.1		33.4	9.7	
LOS	C	B		C	A		C	B		C	A	
Approach Delay		18.7			9.3			14.8			13.7	
Approach LOS		B			A			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	3	3		1	3		7	88		26	44	
Queue Length 95th (ft)	18	19		8	42		30	#289		#94	#298	
Internal Link Dist (ft)		2624			2720			2304			2288	
Turn Bay Length (ft)												
Base Capacity (vph)	150	471		150	520		150	999		193	1244	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.05		0.02	0.26		0.18	0.49		0.54	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 59.4
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 13.8 Intersection LOS: B
Intersection Capacity Utilization 49.0% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Avenue 18 & Road 23

ø1	ø2	ø3	ø4
10 s	24.4 s	9.3 s	21.3 s
ø5	ø6	ø7	ø8
9.3 s	25.1 s	9.3 s	21.3 s

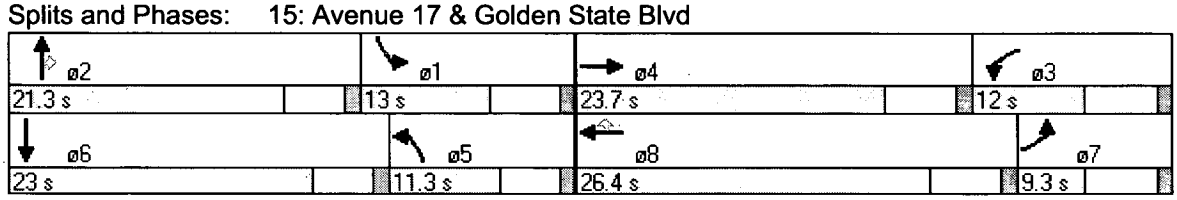
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	1.00	1.00	0.88	0.94	1.00	1.00
Frt		0.990				0.850			0.850		0.921	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	5034	0	3367	4988	1553	1492	1570	2349	4990	1716	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	5034	0	3367	4988	1553	1492	1570	2349	4990	1716	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				473			285		22	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	37	841	62	231	998	435	49	31	262	391	18	20
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	21%	21%	21%	2%	2%	2%
Adj. Flow (vph)	40	914	67	251	1085	473	53	34	285	425	20	22
Lane Group Flow (vph)	40	981	0	251	1085	473	53	34	285	425	42	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3	21.3	9.3	21.3	
Total Split (s)	9.3	23.7	0.0	12.0	26.4	26.4	11.3	21.3	21.3	13.0	23.0	0.0
Total Split (%)	13.3%	33.9%	0.0%	17.1%	37.7%	37.7%	16.1%	30.4%	30.4%	18.6%	32.9%	0.0%
Maximum Green (s)	4.0	18.4		6.7	21.1	21.1	6.7	16.7	16.7	7.7	18.4	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6	3.6	4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max	Max	None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	5.3	19.7		8.0	26.1	26.1	6.9	17.3	17.3	9.0	23.5	
Actuated g/C Ratio	0.08	0.28		0.11	0.37	0.37	0.10	0.25	0.25	0.13	0.34	
v/c Ratio	0.30	0.69		0.65	0.58	0.54	0.36	0.09	0.36	0.66	0.07	
Control Delay	36.8	25.0		30.8	13.2	3.3	36.5	21.1	4.5	34.6	12.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	36.8	25.0		30.8	13.2	3.3	36.5	21.1	4.5	34.6	12.4	
LOS	D	C		C	B	A	D	C	A	C	B	
Approach Delay		25.4			13.0			10.6			32.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	17	134		58	118	37	22	11	0	63	6	
Queue Length 95th (ft)	45	177		m#88	108	20	54	32	29	92	28	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	134	1428		385	1861	876	156	388	795	642	591	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.30	0.69		0.65	0.58	0.54	0.34	0.09	0.36	0.66	0.07	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 64 (91%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 18.7 Intersection LOS: B
Intersection Capacity Utilization 48.3% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



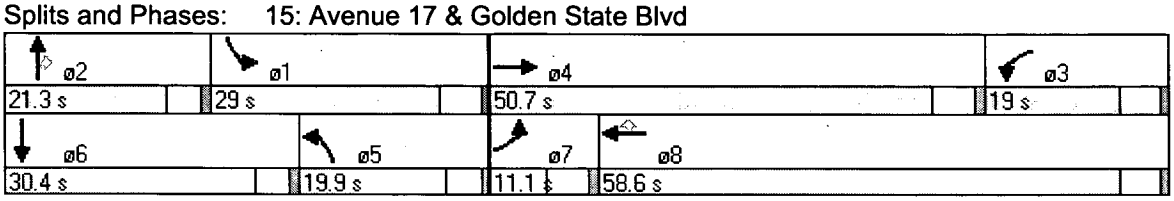
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	1.00	1.00	1.00	0.88	0.94	1.00	1.00
Frt		0.994				0.850			0.850		0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	5055	0	3213	4759	1482	1736	1827	2733	4990	1703	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	5055	0	3213	4759	1482	1736	1827	2733	4990	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				799			363		52	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		547			488			1041			928	
Travel Time (s)		8.3			7.4			20.3			18.1	
Volume (vph)	60	1598	71	334	1507	806	110	53	476	905	37	50
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
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	4%	4%	4%	2%	2%	2%
Adj. Flow (vph)	65	1737	77	363	1638	876	120	58	517	984	40	54
Lane Group Flow (vph)	65	1814	0	363	1638	876	120	58	517	984	94	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3	21.3	9.3	21.3	21.3	9.3	21.3	
Total Split (s)	11.1	50.7	0.0	19.0	58.6	58.6	19.9	21.3	21.3	29.0	30.4	0.0
Total Split (%)	9.3%	42.3%	0.0%	15.8%	48.8%	48.8%	16.6%	17.8%	17.8%	24.2%	25.3%	0.0%
Maximum Green (s)	5.8	45.4		13.7	53.3	53.3	15.3	16.7	16.7	23.7	25.8	
Yellow Time (s)	4.3	4.3		4.3	4.3	4.3	3.6	3.6	3.6	4.3	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	Max	Max	None	Max	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	7.1	46.7		15.0	56.8	56.8	15.9	17.3	17.3	25.0	26.4	
Actuated g/C Ratio	0.06	0.39		0.12	0.47	0.47	0.13	0.14	0.14	0.21	0.22	
v/c Ratio	0.62	0.92		0.90	0.73	0.78	0.52	0.22	0.73	0.95	0.23	
Control Delay	80.3	43.6		62.4	21.6	9.1	57.5	47.9	21.3	64.7	20.5	
Queue Delay	0.0	2.5		0.0	1.7	4.8	0.0	0.0	0.4	31.1	0.0	
Total Delay	80.3	46.1		62.4	23.3	13.9	57.5	47.9	21.7	95.8	20.5	
LOS	F	D		E	C	B	E	D	C	F	C	
Approach Delay		47.3			25.4			30.0			89.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			C			C			F	
Queue Length 50th (ft)	50	482		149	367	197	88	40	62	268	26	
Queue Length 95th (ft)	#116	#558		m#195	m424	m480	151	82	132	#354	72	
Internal Link Dist (ft)		467			408			961			848	
Turn Bay Length (ft)												
Base Capacity (vph)	105	1971		402	2253	1123	230	263	705	1040	415	
Starvation Cap Reductn	0	0		0	420	183	0	0	0	0	0	
Spillback Cap Reductn	0	84		0	0	0	0	0	26	119	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.62	0.96		0.90	0.89	0.93	0.52	0.22	0.76	1.07	0.23	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 42.7 Intersection LOS: D
Intersection Capacity Utilization 76.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Avenue 17 & Golden State Blvd



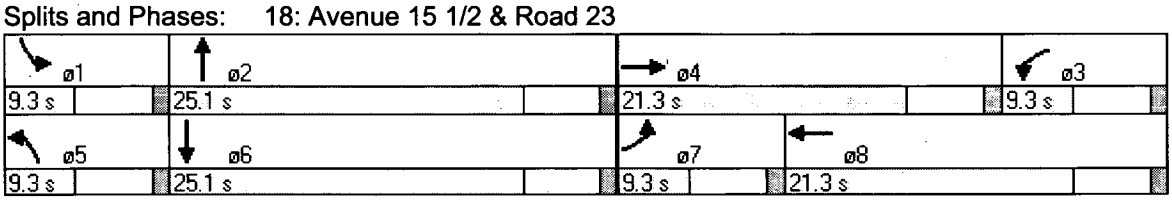
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.855			0.997			0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1674	0	1626	1464	0	1504	1579	0	1570	1636	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1674	0	1626	1464	0	1504	1579	0	1570	1636	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			30			2			6	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	1	1	1	32	1	28	1	370	8	1	346	24
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
Heavy Vehicles (%)	5%	5%	5%	11%	11%	11%	20%	20%	20%	15%	15%	15%
Adj. Flow (vph)	1	1	1	35	1	30	1	402	9	1	376	26
Lane Group Flow (vph)	1	2	0	35	31	0	1	411	0	1	402	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	25.1	0.0	9.3	25.1	0.0
Total Split (%)	14.3%	32.8%	0.0%	14.3%	32.8%	0.0%	14.3%	38.6%	0.0%	14.3%	38.6%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	19.8		4.0	19.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.4	8.3		6.9	9.0		6.4	67.6		6.4	67.6	
Actuated g/C Ratio	0.08	0.10		0.08	0.10		0.08	0.87		0.08	0.87	
v/c Ratio	0.01	0.01		0.26	0.17		0.01	0.30		0.01	0.28	
Control Delay	19.0	16.0		22.1	10.1		19.0	6.2		19.0	5.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.0	16.0		22.1	10.1		19.0	6.2		19.0	5.5	
LOS	B	B		C	B		B	A		B	A	
Approach Delay		17.0			16.5			6.2			5.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			A			A	
Queue Length 50th (ft)	0	0		11	0		0	0		0	0	
Queue Length 95th (ft)	4	6		33	19		4	#215		4	191	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	129	348		133	330		114	1381		118	1432	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.26	0.09		0.01	0.30		0.01	0.28	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 77.3
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 6.7 Intersection LOS: A
Intersection Capacity Utilization 35.1% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Avenue 15 1/2 & Road 23



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.859			0.991			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1627	0	1736	1569	0	1703	1776	0	1556	1594	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1627	0	1736	1569	0	1703	1776	0	1556	1594	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			48			5			18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40			45			45	
Link Distance (ft)		3328			3456			3464			3000	
Travel Time (s)		56.7			58.9			52.5			45.5	
Volume (vph)	1	2	2	38	3	44	2	535	33	1	507	111
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
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	6%	6%	6%	16%	16%	16%
Adj. Flow (vph)	1	2	2	41	3	48	2	582	36	1	551	121
Lane Group Flow (vph)	1	4	0	41	51	0	2	618	0	1	672	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	9.3	21.3		9.3	21.3		9.3	21.3		9.3	21.3	
Total Split (s)	9.3	21.3	0.0	9.3	21.3	0.0	9.3	40.1	0.0	9.3	40.1	0.0
Total Split (%)	11.6%	26.6%	0.0%	11.6%	26.6%	0.0%	11.6%	50.1%	0.0%	11.6%	50.1%	0.0%
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	34.8		4.0	34.8	
Yellow Time (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.7	7.7		7.1	8.6		5.7	63.6		5.7	63.6	
Actuated g/C Ratio	0.07	0.09		0.08	0.10		0.07	0.79		0.07	0.79	
v/c Ratio	0.01	0.03		0.28	0.25		0.02	0.44		0.01	0.53	
Control Delay	29.0	23.5		30.4	12.2		29.5	7.0		29.0	9.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.0	23.5		30.4	12.2		29.5	7.0		29.0	9.1	
LOS	C	C		C	B		C	A		C	A	
Approach Delay		24.6			20.3			7.1			9.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			A			A	
Queue Length 50th (ft)	0	1		15	1		1	58		0	69	
Queue Length 95th (ft)	5	9		45	30		7	317		5	#450	
Internal Link Dist (ft)		3248			3376			3384			2920	
Turn Bay Length (ft)												
Base Capacity (vph)	108	312		145	352		110	1411		101	1269	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.28	0.14		0.02	0.44		0.01	0.53	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80.1
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 9.0 Intersection LOS: A
Intersection Capacity Utilization 48.9% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: Avenue 15 1/2 & Road 23

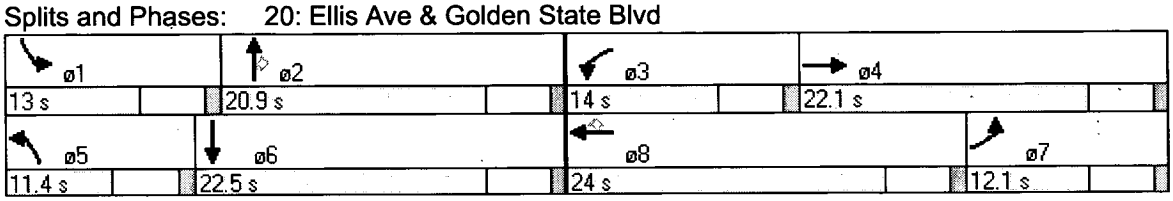
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		1	1		2	2		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00
Frt		0.960				0.850			0.850		0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3398	0	3433	3539	1583	1752	3505	2760	2575	1302	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3398	0	3433	3539	1583	1752	3505	2760	2575	1302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		70				445			462		58	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	165	377	136	395	307	409	108	150	425	269	106	88
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	36%	36%	36%
Adj. Flow (vph)	179	410	148	429	334	445	117	163	462	292	115	96
Lane Group Flow (vph)	179	558	0	429	334	445	117	163	462	292	211	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9	20.9	8.9	20.9	20.9	8.9	20.9	
Total Split (s)	12.1	22.1	0.0	14.0	24.0	24.0	11.4	20.9	20.9	13.0	22.5	0.0
Total Split (%)	17.3%	31.6%	0.0%	20.0%	34.3%	34.3%	16.3%	29.9%	29.9%	18.6%	32.1%	0.0%
Maximum Green (s)	7.2	17.2		9.1	19.1	19.1	6.5	16.0	16.0	8.1	17.6	
Yellow Time (s)	3.9	3.9		3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	8.1	19.7		12.8	24.4	24.4	7.3	12.5	12.5	9.0	16.4	
Actuated g/C Ratio	0.12	0.28		0.18	0.35	0.35	0.10	0.18	0.18	0.13	0.23	
v/c Ratio	0.87	0.56		0.68	0.27	0.53	0.64	0.26	0.53	0.88	0.60	
Control Delay	71.2	21.7		27.7	13.5	5.6	47.9	24.6	4.9	59.8	25.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	71.2	21.7		27.7	13.5	5.6	47.9	24.6	4.9	59.8	25.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	C		C	B	A	D	C	A	E	C	
Approach Delay		33.7			15.6			16.0			45.4	
Approach LOS		C			B			B			D	
Queue Length 50th (ft)	77	96		76	53	23	49	32	0	64	60	
Queue Length 95th (ft)	#184	145		#164	68	38	#118	53	36	#131	120	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	205	1005		630	1234	842	185	846	1017	331	393	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.87	0.56		0.68	0.27	0.53	0.63	0.19	0.45	0.88	0.54	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 47 (67%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 24.6 Intersection LOS: C
Intersection Capacity Utilization 56.3% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



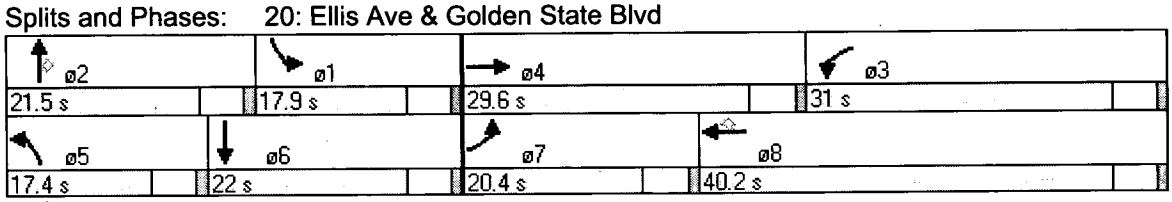
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	200		0	50		0	200		0
Storage Lanes	1		0	2		1	1		2	2		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00
Frt		0.958				0.850			0.850		0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	3433	3539	1583	1597	3195	2515	3433	1753	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	3433	3539	1583	1597	3195	2515	3433	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55				458			879		29	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		559			1080			510			826	
Travel Time (s)		12.7			24.5			11.6			18.8	
Volume (vph)	202	583	227	847	498	571	191	254	918	407	184	120
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	2%	2%	2%
Adj. Flow (vph)	220	634	247	921	541	621	208	276	998	442	200	130
Lane Group Flow (vph)	220	881	0	921	541	621	208	276	998	442	330	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	8	5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.9	20.9		8.9	20.9	20.9	8.9	20.9	20.9	8.9	20.9	
Total Split (s)	20.4	29.6	0.0	31.0	40.2	40.2	17.4	21.5	21.5	17.9	22.0	0.0
Total Split (%)	20.4%	29.6%	0.0%	31.0%	40.2%	40.2%	17.4%	21.5%	21.5%	17.9%	22.0%	0.0%
Maximum Green (s)	15.5	24.7		26.1	35.3	35.3	12.5	16.6	16.6	13.0	17.1	
Yellow Time (s)	3.9	3.9		3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		5.0			5.0	5.0		5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	15.6	25.6		27.0	37.0	37.0	13.4	16.2	16.2	15.2	18.0	
Actuated g/C Ratio	0.16	0.26		0.27	0.37	0.37	0.13	0.16	0.16	0.15	0.18	
v/c Ratio	0.79	0.97		0.99	0.41	0.71	0.97	0.53	0.87	0.85	0.97	
Control Delay	62.0	58.6		51.2	15.2	10.0	99.7	42.3	15.3	58.2	81.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.0	58.6		51.2	15.2	10.0	99.7	42.3	15.3	58.2	81.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	E		D	B	B	F	D	B	E	F	
Approach Delay		59.3			29.6			32.2			68.1	
Approach LOS		E			C			C			E	
Queue Length 50th (ft)	135	277		293	106	114	134	84	37	145	194	
Queue Length 95th (ft)	#245	#410		m#399	m135	m96	#278	126	#142	#238	#371	
Internal Link Dist (ft)		479			1000			430			746	
Turn Bay Length (ft)	50			200			50			200		
Base Capacity (vph)	290	909		927	1308	874	214	559	1165	522	339	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.76	0.97		0.99	0.41	0.71	0.97	0.49	0.86	0.85	0.97	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 36 (36%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 41.8 Intersection LOS: D
Intersection Capacity Utilization 88.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 20: Ellis Ave & Golden State Blvd



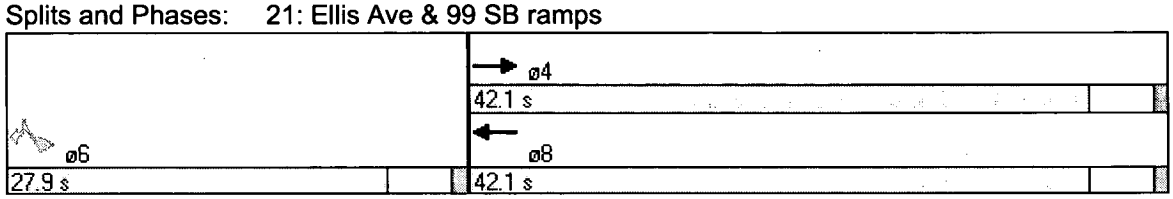
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	2		2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3505	0	0	3167	0	0	0	0	3303	0	2682
Flt Permitted										0.950		
Satd. Flow (perm)	0	3505	0	0	3167	0	0	0	0	3303	0	2682
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												330
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1067	0	0	673	0	0	0	0	355	0	437
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
Heavy Vehicles (%)	3%	3%	3%	14%	14%	14%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	1160	0	0	732	0	0	0	0	386	0	475
Lane Group Flow (vph)	0	1160	0	0	732	0	0	0	0	386	0	475
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	42.1	0.0	0.0	42.1	0.0	0.0	0.0	0.0	27.9	0.0	27.9
Total Split (%)	0.0%	60.1%	0.0%	0.0%	60.1%	0.0%	0.0%	0.0%	0.0%	39.9%	0.0%	39.9%
Maximum Green (s)		37.2			37.2					23.0		23.0
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		46.7			46.7					15.3		15.3
Actuated g/C Ratio		0.67			0.67					0.22		0.22
v/c Ratio		0.50			0.35					0.54		0.56
Control Delay		3.3			3.6					26.4		9.8
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		3.3			3.6					26.4		9.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			A					C		A
Approach Delay		3.3			3.6							
Approach LOS		A			A							
Queue Length 50th (ft)		38			0					75		29
Queue Length 95th (ft)		m48			136					103		64
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2340			2115					1128		1133
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.50			0.35					0.34		0.42

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 4 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 7.8 Intersection LOS: A
Intersection Capacity Utilization 59.6% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



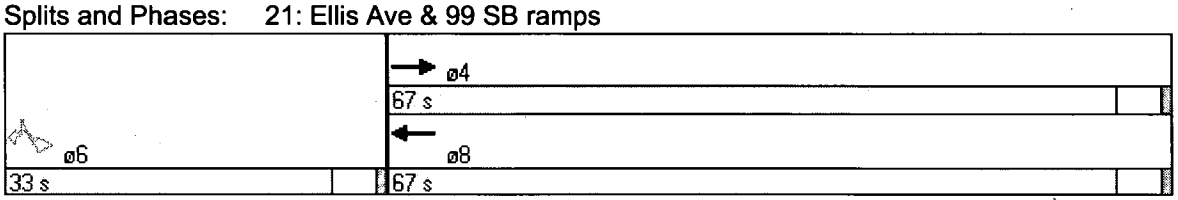
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	225		225
Storage Lanes	0		0	0		0	0		0	2		2
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50			50					50		50
Trailing Detector (ft)		0			0					0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt												0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	3367	0	2733
Flt Permitted										0.950		
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	3367	0	2733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												151
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1080			710			661			1084	
Travel Time (s)		24.5			16.1			15.0			24.6	
Volume (vph)	0	1908	0	0	1108	0	0	0	0	575	0	808
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	2074	0	0	1204	0	0	0	0	625	0	878
Lane Group Flow (vph)	0	2074	0	0	1204	0	0	0	0	625	0	878
Turn Type										custom		custom
Protected Phases		4			8							
Permitted Phases										6		6
Detector Phases		4			8					6		6
Minimum Initial (s)		4.0			4.0					4.0		4.0
Minimum Split (s)		20.9			20.9					20.9		20.9
Total Split (s)	0.0	67.0	0.0	0.0	67.0	0.0	0.0	0.0	0.0	33.0	0.0	33.0
Total Split (%)	0.0%	67.0%	0.0%	0.0%	67.0%	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%	33.0%
Maximum Green (s)		62.1			62.1					28.1		28.1
Yellow Time (s)		3.9			3.9					3.9		3.9
All-Red Time (s)		1.0			1.0					1.0		1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0					3.0		3.0
Recall Mode		C-Min			C-Min					None		None
Walk Time (s)		5.0			5.0					5.0		5.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		62.3			62.3					29.7		29.7
Actuated g/C Ratio		0.62			0.62					0.30		0.30
v/c Ratio		0.94			0.55					0.62		0.96
Control Delay		12.3			6.3					33.9		50.5
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		12.3			6.3					33.9		50.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B			A					C		D
Approach Delay		12.3			6.3							
Approach LOS		B			A							
Queue Length 50th (ft)		197			227					178		269
Queue Length 95th (ft)		m#483			m249					238		#417
Internal Link Dist (ft)		1000			630			581			1004	
Turn Bay Length (ft)										225		225
Base Capacity (vph)		2230			2230					1000		919
Starvation Cap Reductn		0			0					0		0
Spillback Cap Reductn		0			0					0		0
Storage Cap Reductn		0			0					0		0
Reduced v/c Ratio		0.93			0.54					0.63		0.96

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 6 (6%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 20.6 Intersection LOS: C
Intersection Capacity Utilization 91.9% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Ellis Ave & 99 SB ramps



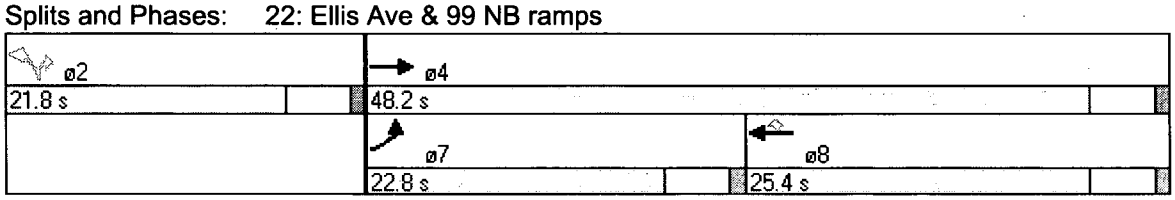
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3367	3471	0	0	3312	1482	3273	0	1509	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3367	3471	0	0	3312	1482	3273	0	1509	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						402			322			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	535	522	0	0	544	370	402	0	296	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	9%	9%	9%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	582	567	0	0	591	402	437	0	322	0	0	0
Lane Group Flow (vph)	582	567	0	0	591	402	437	0	322	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9	20.9	20.9		20.9			
Total Split (s)	22.8	48.2	0.0	0.0	25.4	25.4	21.8	0.0	21.8	0.0	0.0	0.0
Total Split (%)	32.6%	68.9%	0.0%	0.0%	36.3%	36.3%	31.1%	0.0%	31.1%	0.0%	0.0%	0.0%
Maximum Green (s)	17.9	43.3			20.5	20.5	16.9		16.9			
Yellow Time (s)	3.9	3.9			3.9	3.9	3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Min			C-Min	C-Min	None		None			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	17.7	46.6			24.9	24.9	15.4		15.4			
Actuated g/C Ratio	0.25	0.67			0.36	0.36	0.22		0.22			
v/c Ratio	0.68	0.25			0.50	0.51	0.61		0.55			
Control Delay	26.6	4.1			20.7	4.9	28.1		6.9			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	26.6	4.1			20.7	4.9	28.1		6.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			C	A	C		A			
Approach Delay		15.5			14.3							
Approach LOS		B			B							
Queue Length 50th (ft)	100	30			112	0	87		0			
Queue Length 95th (ft)	149	48			161	58	125		57			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	922	2313			1179	786	832		624			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.63	0.25			0.50	0.51	0.53		0.52			

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 40 (57%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 59.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 22: Ellis Ave & 99 NB ramps



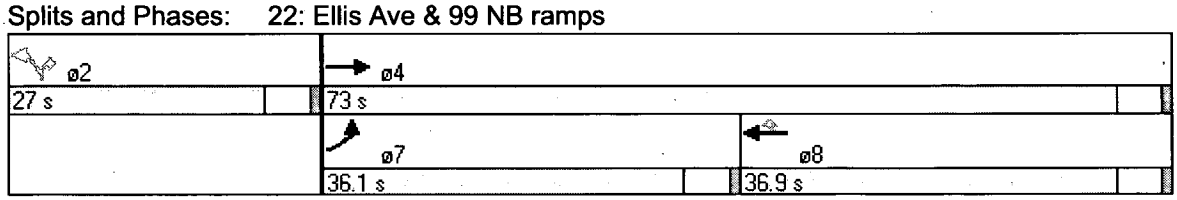
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	150		150	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	3539	0	0	3505	1568	3433	0	1583	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	3539	0	0	3505	1568	3433	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						459			191			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		710			940			635			1128	
Travel Time (s)		16.1			21.4			14.4			25.6	
Volume (vph)	981	844	0	0	978	588	614	0	455	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1066	917	0	0	1063	639	667	0	495	0	0	0
Lane Group Flow (vph)	1066	917	0	0	1063	639	667	0	495	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.9	20.9			20.9	20.9	20.9		20.9			
Total Split (s)	36.1	73.0	0.0	0.0	36.9	36.9	27.0	0.0	27.0	0.0	0.0	0.0
Total Split (%)	36.1%	73.0%	0.0%	0.0%	36.9%	36.9%	27.0%	0.0%	27.0%	0.0%	0.0%	0.0%
Maximum Green (s)	31.2	68.1			32.0	32.0	22.1		22.1			
Yellow Time (s)	3.9	3.9			3.9	3.9	3.9		3.9			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Min			C-Min	C-Min	None		None			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	32.1	69.0			32.9	32.9	23.0		23.0			
Actuated g/C Ratio	0.32	0.69			0.33	0.33	0.23		0.23			
v/c Ratio	0.97	0.38			0.92	0.78	0.84		0.97			
Control Delay	42.0	4.4			46.4	15.7	48.1		57.6			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	42.0	4.4			46.4	15.7	48.1		57.6			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A			D	B	D		E			
Approach Delay		24.6			34.9							
Approach LOS		C			C							
Queue Length 50th (ft)	327	89			341	97	210		207			
Queue Length 95th (ft)	m#414	m104			#470	256	#299		#420			
Internal Link Dist (ft)		630			860			555			1048	
Turn Bay Length (ft)	300						150		150			
Base Capacity (vph)	1102	2442			1153	824	790		511			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.97	0.38			0.92	0.78	0.84		0.97			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 76 (76%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 34.8 Intersection LOS: C
Intersection Capacity Utilization 91.9% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Ellis Ave & 99 NB ramps



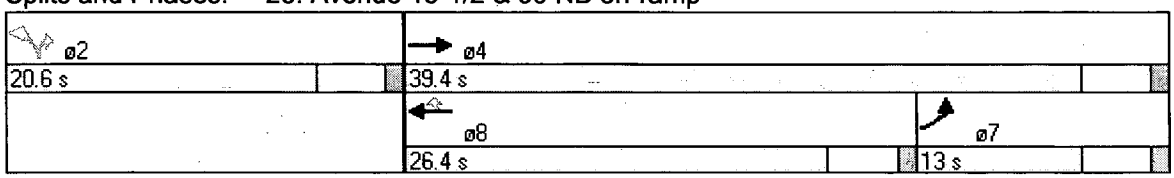
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		3	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	0.76	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	5085	0	0	4988	1553	3242	0	3409	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	5085	0	0	4988	1553	3242	0	3409	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						500			237			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	287	963	0	0	1299	460	386	0	468	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	8%	8%	8%	0%	0%	0%
Adj. Flow (vph)	312	1047	0	0	1412	500	420	0	509	0	0	0
Lane Group Flow (vph)	312	1047	0	0	1412	500	420	0	509	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	13.0	39.4	0.0	0.0	26.4	26.4	20.6	0.0	20.6	0.0	0.0	0.0
Total Split (%)	21.7%	65.7%	0.0%	0.0%	44.0%	44.0%	34.3%	0.0%	34.3%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	34.8			21.8	21.8	16.0		16.0			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	9.0	37.9			24.9	24.9	14.1		14.1			
Actuated g/C Ratio	0.15	0.63			0.42	0.42	0.24		0.24			
v/c Ratio	0.61	0.33			0.68	0.53	0.55		0.52			
Control Delay	31.4	4.0			17.0	4.0	22.6		11.9			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	31.4	4.0			17.0	4.0	22.6		11.9			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A			B	A	C		B			
Approach Delay		10.3			13.6							
Approach LOS		B			B							
Queue Length 50th (ft)	67	46			150	0	67		35			
Queue Length 95th (ft)	103	58			207	52	101		63			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	515	3212			2070	937	897		1115			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.61	0.33			0.68	0.53	0.47		0.46			

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 62.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



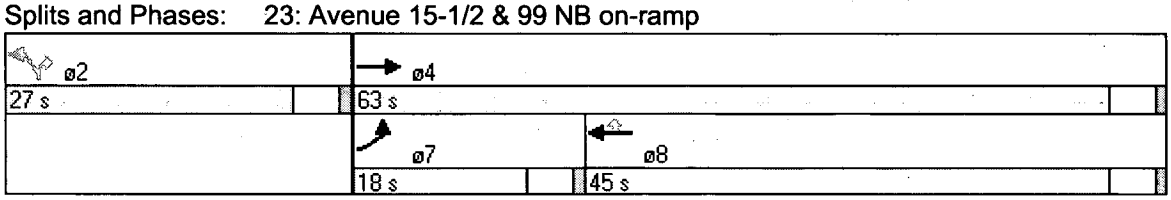
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		250	0		0	0		0
Storage Lanes	2		0	0		1	2		3	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50		50			
Trailing Detector (ft)	0	0			0	0	0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	0.76	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3433	5085	0	0	5085	1583	3400	0	3575	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3433	5085	0	0	5085	1583	3400	0	3575	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						687			18			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		410			274			955			948	
Travel Time (s)		8.0			5.3			21.7			21.5	
Volume (vph)	472	2157	0	0	2072	807	794	0	810	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	0%	0%	0%
Adj. Flow (vph)	513	2345	0	0	2252	877	863	0	880	0	0	0
Lane Group Flow (vph)	513	2345	0	0	2252	877	863	0	880	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	7	4			8							
Permitted Phases						8	2		2			
Detector Phases	7	4			8	8	2		2			
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Minimum Split (s)	8.6	20.6			20.6	20.6	20.6		20.6			
Total Split (s)	18.0	63.0	0.0	0.0	45.0	45.0	27.0	0.0	27.0	0.0	0.0	0.0
Total Split (%)	20.0%	70.0%	0.0%	0.0%	50.0%	50.0%	30.0%	0.0%	30.0%	0.0%	0.0%	0.0%
Maximum Green (s)	13.4	58.4			40.4	40.4	22.4		22.4			
Yellow Time (s)	3.6	3.6			3.6	3.6	3.6		3.6			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0		1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min		Min			
Walk Time (s)		5.0			5.0	5.0	5.0		5.0			
Flash Dont Walk (s)		11.0			11.0	11.0	11.0		11.0			
Pedestrian Calls (#/hr)		0			0	0	0		0			
Act Effct Green (s)	14.0	59.0			41.0	41.0	23.0		23.0			
Actuated g/C Ratio	0.16	0.66			0.46	0.46	0.26		0.26			
v/c Ratio	0.96	0.70			0.97	0.80	0.99		0.95			
Control Delay	61.3	2.4			38.0	11.1	63.7		53.0			
Queue Delay	0.0	0.4			0.0	0.0	0.0		0.0			
Total Delay	61.3	2.8			38.0	11.1	63.7		53.0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A			D	B	E		D			
Approach Delay		13.3			30.4							
Approach LOS		B			C							
Queue Length 50th (ft)	152	77			442	65	252		212			
Queue Length 95th (ft)	m#175	m78			#574	262	#380		#315			
Internal Link Dist (ft)		330			194			875			868	
Turn Bay Length (ft)	250					250						
Base Capacity (vph)	534	3334			2317	1095	869		927			
Starvation Cap Reductn	0	463			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.96	0.82			0.97	0.80	0.99		0.95			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 97.4% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: Avenue 15-1/2 & 99 NB on-ramp



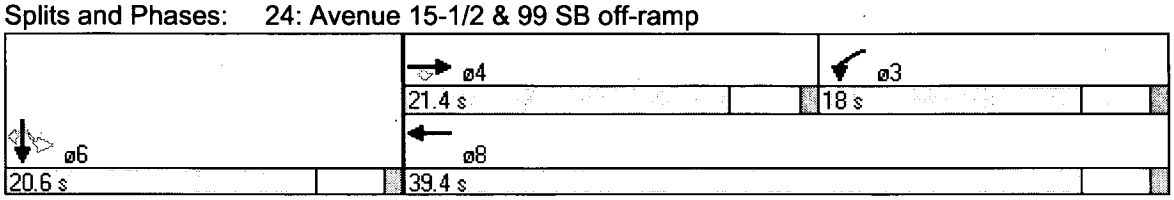
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.953	
Satd. Flow (prot)	0	5085	1583	3367	4988	0	0	0	0	1681	1686	1583
Flt Permitted				0.950						0.950	0.953	
Satd. Flow (perm)	0	5085	1583	3367	4988	0	0	0	0	1681	1686	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			475									64
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	877	437	535	1150	0	0	0	0	373	1	237
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
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	953	475	582	1250	0	0	0	0	405	1	258
Lane Group Flow (vph)	0	953	475	582	1250	0	0	0	0	203	203	258
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	21.4	21.4	18.0	39.4	0.0	0.0	0.0	0.0	20.6	20.6	20.6
Total Split (%)	0.0%	35.7%	35.7%	30.0%	65.7%	0.0%	0.0%	0.0%	0.0%	34.3%	34.3%	34.3%
Maximum Green (s)		16.8	16.8	13.4	34.8					16.0	16.0	16.0
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		20.8	20.8	14.0	38.8					13.2	13.2	13.2
Actuated g/C Ratio		0.35	0.35	0.23	0.65					0.22	0.22	0.22
v/c Ratio		0.54	0.55	0.74	0.39					0.55	0.55	0.65
Control Delay		17.9	4.9	17.9	1.0					25.9	25.8	23.3
Queue Delay		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Total Delay		17.9	4.9	17.9	1.0					25.9	25.8	23.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B	A	B	A					C	C	C
Approach Delay		13.6			6.4						24.9	
Approach LOS		B			A						C	
Queue Length 50th (ft)		101	0	107	0					67	67	62
Queue Length 95th (ft)		148	59	#130	19					120	120	121
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		1766	860	786	3229					465	466	484
Starvation Cap Reductn		0	0	0	0					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.54	0.55	0.74	0.39					0.44	0.44	0.53

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 12.1 Intersection LOS: B
Intersection Capacity Utilization 62.7% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



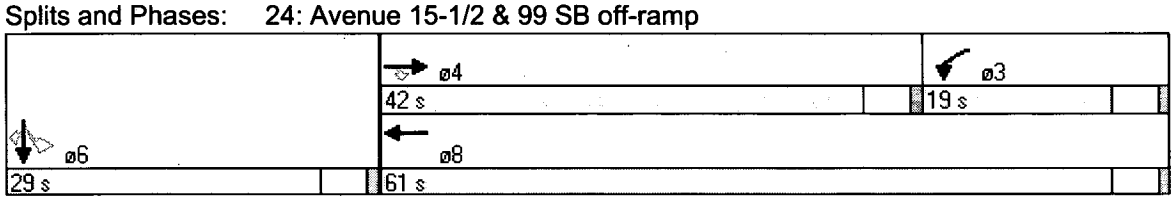
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	250		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.952	
Satd. Flow (prot)	0	5085	1583	3433	5085	0	0	0	0	1681	1685	1583
Flt Permitted				0.950						0.950	0.952	
Satd. Flow (perm)	0	5085	1583	3433	5085	0	0	0	0	1681	1685	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			688									4
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1121			410			902			859	
Travel Time (s)		21.8			8.0			20.5			19.5	
Volume (vph)	0	1828	828	487	2379	0	0	0	0	801	1	392
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Adj. Flow (vph)	0	1987	900	529	2586	0	0	0	0	871	1	426
Lane Group Flow (vph)	0	1987	900	529	2586	0	0	0	0	436	436	426
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases			4							6		6
Detector Phases		4	4	3	8					6	6	6
Minimum Initial (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.6	20.6	8.6	20.6					20.6	20.6	20.6
Total Split (s)	0.0	42.0	42.0	19.0	61.0	0.0	0.0	0.0	0.0	29.0	29.0	29.0
Total Split (%)	0.0%	46.7%	46.7%	21.1%	67.8%	0.0%	0.0%	0.0%	0.0%	32.2%	32.2%	32.2%
Maximum Green (s)		37.4	37.4	14.4	56.4					24.4	24.4	24.4
Yellow Time (s)		3.6	3.6	3.6	3.6					3.6	3.6	3.6
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		5.0	5.0		5.0					5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0					11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		38.0	38.0	15.0	57.0					25.0	25.0	25.0
Actuated g/C Ratio		0.42	0.42	0.17	0.63					0.28	0.28	0.28
v/c Ratio		0.93	0.84	0.92	0.80					0.93	0.93	0.96
Control Delay		33.6	14.4	38.5	7.4					61.6	61.1	68.0
Queue Delay		0.0	0.0	0.0	0.7					0.0	0.0	0.0
Total Delay		33.6	14.4	38.5	8.1					61.6	61.1	68.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C	B	D	A					E	E	E
Approach Delay		27.6			13.3						63.5	
Approach LOS		C			B						E	
Queue Length 50th (ft)		382	91	145	164					253	253	237
Queue Length 95th (ft)		#495	#419	m145	m167					#446	#445	#427
Internal Link Dist (ft)		1041			330			822			779	
Turn Bay Length (ft)			250	250								
Base Capacity (vph)		2147	1066	572	3221					467	468	443
Starvation Cap Reductn		0	0	0	286					0	0	0
Spillback Cap Reductn		0	0	0	0					0	0	0
Storage Cap Reductn		0	0	0	0					0	0	0
Reduced v/c Ratio		0.93	0.84	0.92	0.88					0.93	0.93	0.96

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 27.9 Intersection LOS: C
Intersection Capacity Utilization 97.4% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Avenue 15-1/2 & 99 SB off-ramp



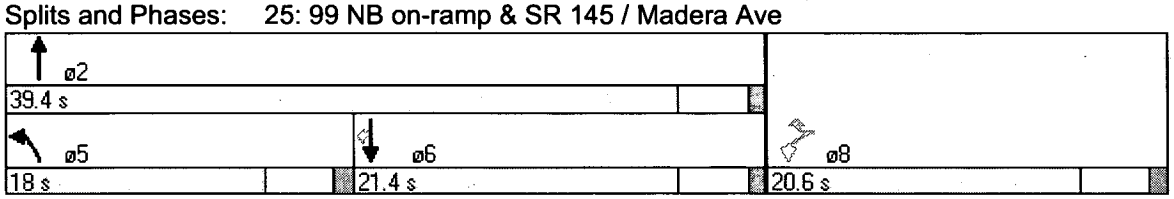
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.91	0.91
Frt						0.850					0.917	0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	3539	0	0	3109	1441
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	3539	0	0	3109	1441
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						53					356	356
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	678	0	49	682	759	0	0	268	655
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	737	0	53	741	825	0	0	291	712
Lane Group Flow (vph)	0	0	0	737	0	53	741	825	0	0	647	356
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	20.6	0.0	20.6	18.0	39.4	0.0	0.0	21.4	21.4
Total Split (%)	0.0%	0.0%	0.0%	34.3%	0.0%	34.3%	30.0%	65.7%	0.0%	0.0%	35.7%	35.7%
Maximum Green (s)				16.0		16.0	13.4	34.8			16.8	16.8
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				17.1		17.1	15.5	34.9			15.4	15.4
Actuated g/C Ratio				0.28		0.28	0.26	0.58			0.26	0.26
v/c Ratio				0.75		0.11	0.84	0.40			0.61	0.56
Control Delay				25.6		6.2	30.8	7.9			11.2	6.2
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				25.6		6.2	30.8	7.9			11.2	6.2
LOS				C		A	C	A			B	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								18.7			9.4	
Approach LOS								B			A	
Queue Length 50th (ft)				113		0	141	111			49	0
Queue Length 95th (ft)				#189		21	#238	137			89	57
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				1011		503	886	2122			1163	675
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.73		0.11	0.84	0.39			0.56	0.53

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 31 (52%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 17.3 Intersection LOS: B
Intersection Capacity Utilization 63.2% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



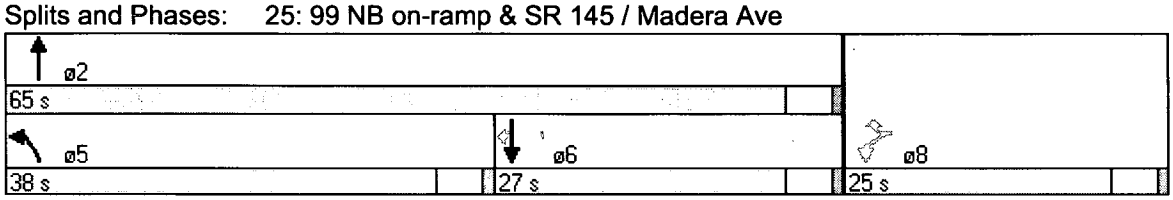
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	0		0
Storage Lanes	0		0	2		1	2		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50		50	50	50			50	50
Trailing Detector (ft)				0		0	0	0			0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.91	0.91
Frt						0.850					0.945	0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3433	0	1583	3433	3539	0	0	3204	1441
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	3433	3539	0	0	3204	1441
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73					106	422
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		694			1135			540			995	
Travel Time (s)		15.8			25.8			7.4			13.6	
Volume (vph)	0	0	0	697	0	67	1120	1064	0	0	449	768
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	758	0	73	1217	1157	0	0	488	835
Lane Group Flow (vph)	0	0	0	758	0	73	1217	1157	0	0	768	555
Turn Type				custom		custom	Prot					Perm
Protected Phases							5	2			6	
Permitted Phases				8		8						6
Detector Phases				8		8	5	2			6	6
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	4.0
Minimum Split (s)				20.6		20.6	8.6	20.6			20.6	20.6
Total Split (s)	0.0	0.0	0.0	25.0	0.0	25.0	38.0	65.0	0.0	0.0	27.0	27.0
Total Split (%)	0.0%	0.0%	0.0%	27.8%	0.0%	27.8%	42.2%	72.2%	0.0%	0.0%	30.0%	30.0%
Maximum Green (s)				20.4		20.4	33.4	60.4			22.4	22.4
Yellow Time (s)				3.6		3.6	3.6	3.6			3.6	3.6
All-Red Time (s)				1.0		1.0	1.0	1.0			1.0	1.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				21.2		21.2	34.1	60.8			22.7	22.7
Actuated g/C Ratio				0.24		0.24	0.38	0.68			0.25	0.25
v/c Ratio				0.94		0.17	0.94	0.48			0.87	0.82
Control Delay				54.4		8.2	24.5	2.4			39.4	19.4
Queue Delay				0.0		0.0	0.0	0.4			0.0	0.0
Total Delay				54.4		8.2	24.5	2.8			39.4	19.4
LOS				D		A	C	A			D	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay								13.9			31.0	
Approach LOS								B			C	
Queue Length 50th (ft)				219		0	201	13			199	69
Queue Length 95th (ft)				#332		34	m#296	m14			#302	#282
Internal Link Dist (ft)		614			1055			460			915	
Turn Bay Length (ft)							250					
Base Capacity (vph)				810		429	1300	2399			898	682
Starvation Cap Reductn				0		0	0	644			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.94		0.17	0.94	0.66			0.86	0.81

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 5 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 25.6 Intersection LOS: C
Intersection Capacity Utilization 82.4% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: 99 NB on-ramp & SR 145 / Madera Ave



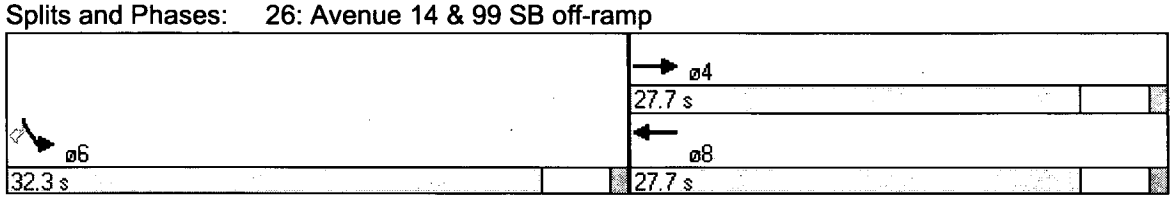
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	3539	0	3400	1568
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	3400	1568
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						78
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	791	719	0	812	372
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	0	860	782	0	883	404
Lane Group Flow (vph)	0	860	782	0	883	404
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	27.7	27.7	0.0	32.3	32.3
Total Split (%)	0.0%	46.2%	46.2%	0.0%	53.8%	53.8%
Maximum Green (s)		23.1	23.1		27.7	27.7
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		29.1	29.1		22.9	22.9
Actuated g/C Ratio		0.48	0.48		0.38	0.38
v/c Ratio		0.50	0.46		0.68	0.63
Control Delay		12.9	7.0		17.9	15.8
Queue Delay		0.0	0.9		0.0	0.0
Total Delay		12.9	7.9		17.9	15.8
LOS		B	A		B	B
Approach Delay		12.9	7.9		17.2	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	A		B	
Queue Length 50th (ft)		105	32		130	89
Queue Length 95th (ft)		179	90		157	143
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1718	1718		1604	781
Starvation Cap Reductn		0	617		0	0
Spillback Cap Reductn		45	0		17	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.51	0.71		0.56	0.52

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 6 (10%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.5 Intersection LOS: B
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



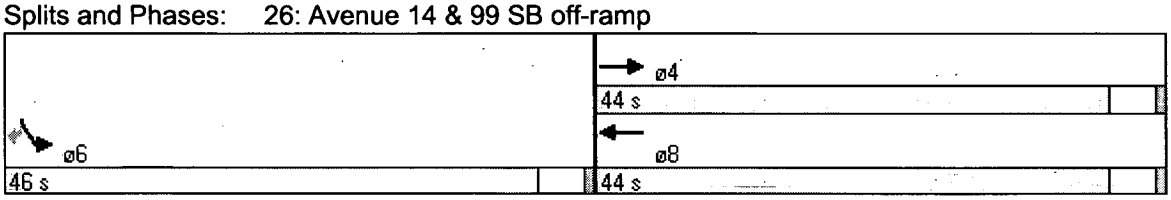
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50		50	50
Trailing Detector (ft)		0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3539	3539	0	3433	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	3433	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						87
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		1444	178		1098	
Travel Time (s)		32.8	4.0		25.0	
Volume (vph)	0	1118	778	0	1166	312
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1215	846	0	1267	339
Lane Group Flow (vph)	0	1215	846	0	1267	339
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Detector Phases		4	8		6	6
Minimum Initial (s)		4.0	4.0		4.0	4.0
Minimum Split (s)		20.6	20.6		20.6	20.6
Total Split (s)	0.0	44.0	44.0	0.0	46.0	46.0
Total Split (%)	0.0%	48.9%	48.9%	0.0%	51.1%	51.1%
Maximum Green (s)		39.4	39.4		41.4	41.4
Yellow Time (s)		3.6	3.6		3.6	3.6
All-Red Time (s)		1.0	1.0		1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Max	C-Max		Min	Min
Walk Time (s)		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)		42.8	42.8		39.2	39.2
Actuated g/C Ratio		0.48	0.48		0.44	0.44
v/c Ratio		0.72	0.50		0.85	0.46
Control Delay		22.7	5.4		28.7	14.6
Queue Delay		1.5	1.0		0.2	0.0
Total Delay		24.2	6.4		28.9	14.6
LOS		C	A		C	B
Approach Delay		24.2	6.4		25.9	
Approach LOS		C	A		C	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		297	60		302	89
Queue Length 95th (ft)		381	76		388	158
Internal Link Dist (ft)		1364	98		1018	
Turn Bay Length (ft)						
Base Capacity (vph)		1683	1683		1602	785
Starvation Cap Reductn		0	537		0	0
Spillback Cap Reductn		275	0		31	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.86	0.74		0.81	0.43

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 44 (49%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 20.8 Intersection LOS: C
Intersection Capacity Utilization 70.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 26: Avenue 14 & 99 SB off-ramp



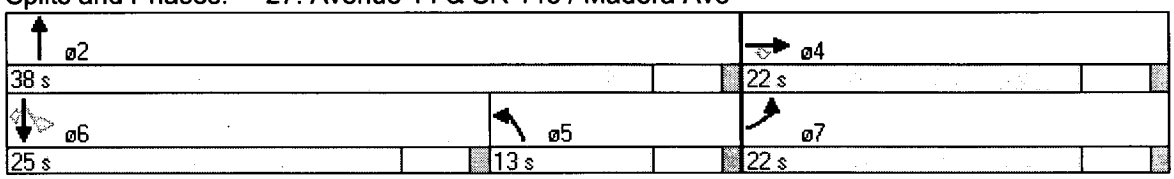
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		2	0		0	2		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50		50	50	50
Trailing Detector (ft)	0	0	0				0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	0.88	1.00	1.00	1.00	0.97	0.91	0.91	1.00	0.95	1.00
Frt			0.850					0.988				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3335	3438	2707	0	0	0	3400	4975	0	1752	3505	1568
Flt Permitted	0.950						0.950			0.190		
Satd. Flow (perm)	3335	3438	2707	0	0	0	3400	4975	0	350	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			748					38				458
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	382	363	858	0	0	0	298	1059	90	40	485	421
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
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	415	395	933	0	0	0	324	1151	98	43	527	458
Lane Group Flow (vph)	415	395	933	0	0	0	324	1249	0	43	527	458
Turn Type	Prot		Perm				Prot			Perm		Perm
Protected Phases	7	4					5	2			6	
Permitted Phases			4							6		6
Detector Phases	7	4	4				5	2		6	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	20.6	20.6				8.6	20.6		20.6	20.6	20.6
Total Split (s)	22.0	22.0	22.0	0.0	0.0	0.0	13.0	38.0	0.0	25.0	25.0	25.0
Total Split (%)	36.7%	36.7%	36.7%	0.0%	0.0%	0.0%	21.7%	63.3%	0.0%	41.7%	41.7%	41.7%
Maximum Green (s)	17.4	17.4	17.4				8.4	33.4		20.4	20.4	20.4
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0		1.0	1.0	1.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	None				None	C-Min		C-Min	C-Min	C-Min
Walk Time (s)		5.0	5.0					5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0					11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0					0		0	0	0
Act Effct Green (s)	14.7	14.7	14.7				9.2	37.3		24.1	24.1	24.1
Actuated g/C Ratio	0.24	0.24	0.24				0.15	0.62		0.40	0.40	0.40
v/c Ratio	0.51	0.47	0.76				0.62	0.40		0.30	0.37	0.51
Control Delay	19.9	19.3	9.1				29.7	6.6		7.7	4.0	2.1
Queue Delay	3.4	2.9	1.2				0.0	0.0		0.0	0.0	0.2
Total Delay	23.3	22.3	10.3				29.7	6.6		7.7	4.0	2.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	B				C	A		A	A	A
Approach Delay		16.1						11.4			3.4	
Approach LOS		B						B			A	
Queue Length 50th (ft)	49	47	31				57	81		4	25	0
Queue Length 95th (ft)	85	m83	75				93	108		m6	m35	m9
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250					
Base Capacity (vph)	1001	1031	1336				526	3106		141	1408	904
Starvation Cap Reductn	478	513	202				0	0		0	0	0
Spillback Cap Reductn	0	0	0				0	0		0	0	68
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.79	0.76	0.82				0.62	0.40		0.30	0.37	0.55

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 56 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 11.4 Intersection LOS: B
Intersection Capacity Utilization 50.1% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



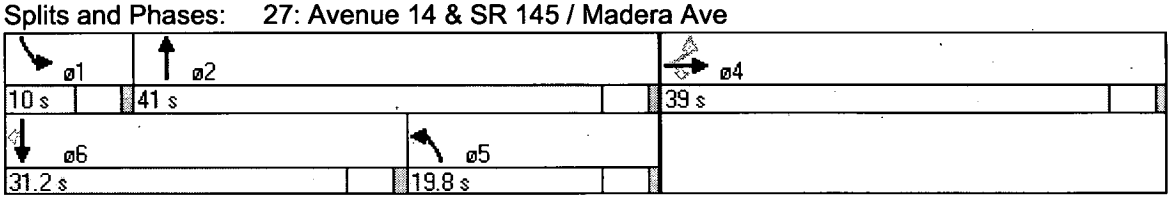
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		250	0		0
Storage Lanes	2		2	0		0	2		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50		50	50	50
Trailing Detector (ft)	0	0	0				0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	0.88	1.00	1.00	1.00	0.97	0.91	0.91	1.00	0.95	1.00
Frt			0.850					0.992				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3367	3471	2733	0	0	0	3433	5045	0	1770	3539	1583
Flt Permitted	0.950						0.950			0.950		
Satd. Flow (perm)	3367	3471	2733	0	0	0	3433	5045	0	1770	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			840					11				475
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		178			812			896			540	
Travel Time (s)		4.0			18.5			12.2			7.4	
Volume (vph)	471	547	1266	0	0	0	341	1713	96	82	627	437
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
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	512	595	1376	0	0	0	371	1862	104	89	682	475
Lane Group Flow (vph)	512	595	1376	0	0	0	371	1966	0	89	682	475
Turn Type	Perm		Perm				Prot			Prot		Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4									6
Detector Phases	4	4	4				5	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0				4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.6	20.6	20.6				8.6	20.6		8.6	20.6	20.6
Total Split (s)	39.0	39.0	39.0	0.0	0.0	0.0	19.8	41.0	0.0	10.0	31.2	31.2
Total Split (%)	43.3%	43.3%	43.3%	0.0%	0.0%	0.0%	22.0%	45.6%	0.0%	11.1%	34.7%	34.7%
Maximum Green (s)	34.4	34.4	34.4				15.2	36.4		5.4	26.6	26.6
Yellow Time (s)	3.6	3.6	3.6				3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0				1.0	1.0		1.0	1.0	1.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max				None	Min		None	Min	Min
Walk Time (s)	5.0	5.0	5.0					5.0			5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0					11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0	0					0			0	0
Act Effct Green (s)	36.5	36.5	36.5				15.6	37.5		6.0	25.9	25.9
Actuated g/C Ratio	0.41	0.41	0.41				0.17	0.42		0.07	0.29	0.29
v/c Ratio	0.38	0.42	0.86				0.62	0.93		0.75	0.67	0.60
Control Delay	18.1	18.6	13.0				39.6	34.8		64.3	10.0	4.2
Queue Delay	15.1	34.1	24.4				0.0	0.0		0.0	0.0	0.4
Total Delay	33.3	52.7	37.4				39.6	34.8		64.3	10.0	4.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D	D				D	C		E	B	A
Approach Delay		40.2						35.6			11.8	
Approach LOS		D						D			B	
Queue Length 50th (ft)	91	107	132				101	382		49	84	32
Queue Length 95th (ft)	m126	m153	#239				147	#500		m55	m93	m36
Internal Link Dist (ft)		98			732			816			460	
Turn Bay Length (ft)							250					
Base Capacity (vph)	1365	1408	1608				603	2109		118	1070	810
Starvation Cap Reductn	837	840	288				0	0		0	0	0
Spillback Cap Reductn	0	0	0				0	0		0	0	77
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.97	1.05	1.04				0.62	0.93		0.75	0.64	0.65

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (98%), Referenced to phase 4:EBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 32.6 Intersection LOS: C
Intersection Capacity Utilization 68.3% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Avenue 14 & SR 145 / Madera Ave



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Ave 18 1/2 @ Pistachio
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	Mitigated 2030 Project AM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	63	426			312	225
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	71	484	0	0	354	255
Percent Heavy Vehicles	37	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						250
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	284
Percent Heavy Vehicles	0	0	0	0	0	25
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (veh/h)	71							284
C (m) (veh/h)	762							628
v/c	0.09							0.45
95% queue length	0.31							2.35
Control Delay (s/veh)	10.2							15.4
LOS	B							C
Approach Delay (s/veh)	–	–				15.4		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/31/2006 9:33 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/30/2006	Analysis Year	2030
Analysis Time Period	Mitigated 2030 Project PM		

Project Description 04-837.1 Alternative C

East/West Street: Avenue 18 1/2	North/South Street: Pistachio
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	610			480	263
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	693	0	0	545	298
Percent Heavy Vehicles	34	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						280
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	318
Percent Heavy Vehicles	0	0	0	0	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (veh/h)	82							318
C (m) (veh/h)	614							564
v/c	0.13							0.56
95% queue length	0.46							3.48
Control Delay (s/veh)	11.8							19.3
LOS	B							C
Approach Delay (s/veh)	–	–				19.3		
Approach LOS	–	–				C		

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 8/31/2006 9:35 AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.915			0.896				0.850		0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1610	0	2398	1166	0	1504	1583	1346	1008	1047	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1610	0	2398	1166	0	1504	1583	1346	1008	1047	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		59			131				285		5	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1597			696			822			681	
Travel Time (s)		31.1			13.6			18.7			15.5	
Volume (vph)	5	40	52	450	51	115	31	78	251	111	44	4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	46%	46%	46%	20%	20%	20%	79%	79%	79%
Adj. Flow (vph)	6	45	59	511	58	131	35	89	285	126	50	5
Lane Group Flow (vph)	6	104	0	511	189	0	35	89	285	126	55	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.6	20.6		8.6	20.6		8.6	20.6	20.6	8.6	20.6	
Total Split (s)	8.6	22.4	0.0	22.0	35.8	0.0	10.7	20.6	20.6	15.0	24.9	0.0
Total Split (%)	10.8%	28.0%	0.0%	27.5%	44.8%	0.0%	13.4%	25.8%	25.8%	18.8%	31.1%	0.0%
Maximum Green (s)	4.0	17.8		17.4	31.2		6.1	16.0	16.0	10.4	20.3	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	5.9	20.5		21.7	44.6		6.5	10.7	10.7	11.0	19.3	
Actuated g/C Ratio	0.07	0.26		0.27	0.56		0.08	0.13	0.13	0.14	0.24	
v/c Ratio	0.05	0.23		0.78	0.27		0.28	0.42	0.67	0.91	0.21	
Control Delay	36.0	14.2		33.6	3.8		40.8	36.6	12.3	93.1	25.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	36.0	14.2		33.6	3.8		40.8	36.6	12.3	93.1	25.8	
LOS	D	B		C	A		D	D	B	F	C	
Approach Delay		15.4			25.6			20.0			72.6	

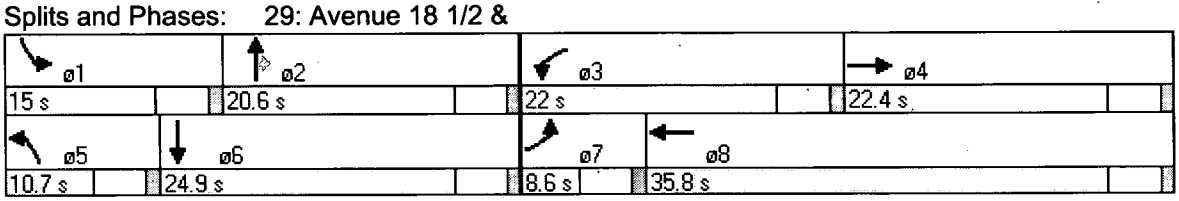
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			B			E	
90th %ile Green (s)	4.0	17.8		17.4	31.2		6.1	16.0	16.0	10.4	20.3	
90th %ile Term Code	Max	Coord		Max	Coord		Max	Max	Max	Max	Hold	
70th %ile Green (s)	0.0	17.8		22.2	44.6		6.1	11.2	11.2	10.4	15.5	
70th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
50th %ile Green (s)	0.0	17.8		23.8	46.2		6.1	9.6	9.6	10.4	13.9	
50th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
30th %ile Green (s)	0.0	19.9		23.3	47.8		0.0	8.0	8.0	10.4	23.0	
30th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
10th %ile Green (s)	0.0	26.4		19.0	50.0		0.0	5.8	5.8	10.4	20.8	
10th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
Queue Length 50th (ft)	3	18		105	1		17	42	0	63	22	
Queue Length 95th (ft)	14	56		#217	60		44	76	57	#159	48	
Internal Link Dist (ft)		1517			616			742			601	
Turn Bay Length (ft)												
Base Capacity (vph)	123	457		652	707		126	328	505	139	285	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.05	0.23		0.78	0.27		0.28	0.27	0.56	0.91	0.19	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 44 (55%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.2 Intersection LOS: C
Intersection Capacity Utilization 39.0% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 29: Avenue 18 1/2 &



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.931			0.916				0.850		0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1734	0	3433	1706	0	1770	1863	1583	1770	1840	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1734	0	3433	1706	0	1770	1863	1583	1770	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			96				468		5	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1597			696			822			681	
Travel Time (s)		31.1			13.6			18.7			15.5	
Volume (vph)	12	90	77	601	100	127	42	90	412	127	63	5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	14	102	88	683	114	144	48	102	468	144	72	6
Lane Group Flow (vph)	14	190	0	683	258	0	48	102	468	144	78	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.6	20.6		8.6	20.6		8.6	20.6	20.6	8.6	20.6	
Total Split (s)	8.6	21.0	0.0	24.0	36.4	0.0	10.4	21.0	21.0	14.0	24.6	0.0
Total Split (%)	10.8%	26.3%	0.0%	30.0%	45.5%	0.0%	13.0%	26.3%	26.3%	17.5%	30.8%	0.0%
Maximum Green (s)	4.0	16.4		19.4	31.8		5.8	16.4	16.4	9.4	20.0	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Min	Min	None	Min	
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0			0			0	0		0	
Act Effct Green (s)	4.6	22.4		21.0	45.7		6.3	11.0	11.0	9.6	18.3	
Actuated g/C Ratio	0.06	0.28		0.26	0.57		0.08	0.14	0.14	0.12	0.23	
v/c Ratio	0.14	0.36		0.76	0.25		0.34	0.40	0.75	0.68	0.18	
Control Delay	39.0	21.5		30.1	6.4		41.9	34.9	11.6	50.9	24.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	39.0	21.5		30.1	6.4		41.9	34.9	11.6	50.9	24.9	
LOS	D	C		C	A		D	C	B	D	C	
Approach Delay		22.7			23.6			17.8			41.8	
Approach LOS		C			C			B			D	

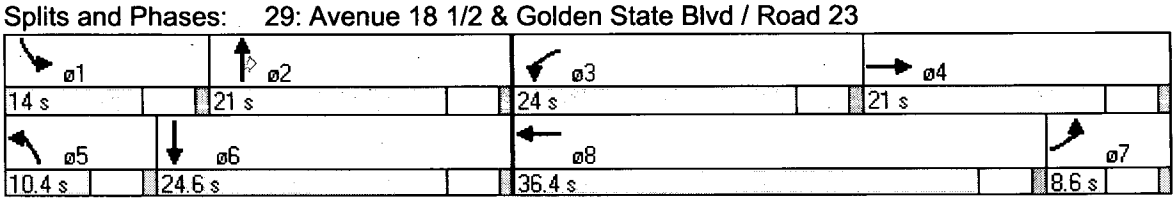
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	4.0	16.4		19.4	31.8		5.8	16.4	16.4	9.4	20.0	
90th %ile Term Code	Max	Coord		Max	Coord		Max	Max	Max	Max	Hold	
70th %ile Green (s)	0.0	16.4		23.9	44.9		5.8	11.9	11.9	9.4	15.5	
70th %ile Term Code	Skip	Coord		Max	Coord		Max	Gap	Gap	Max	Hold	
50th %ile Green (s)	0.0	19.3		23.4	47.3		5.8	9.5	9.5	9.4	13.1	
50th %ile Term Code	Skip	Coord		Gap	Coord		Max	Gap	Gap	Max	Hold	
30th %ile Green (s)	0.0	23.8		20.4	48.8		0.0	8.0	8.0	9.4	22.0	
30th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Max	Hold	
10th %ile Green (s)	0.0	33.2		14.9	52.7		0.0	6.0	6.0	7.5	18.1	
10th %ile Term Code	Skip	Coord		Gap	Coord		Skip	Gap	Gap	Gap	Hold	
Queue Length 50th (ft)	7	58		136	18		23	48	0	70	32	
Queue Length 95th (ft)	24	118		213	m102		55	82	68	#140	60	
Internal Link Dist (ft)		1517			616			742			601	
Turn Bay Length (ft)												
Base Capacity (vph)	102	521		940	1016		142	396	705	221	487	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.14	0.36		0.73	0.25		0.34	0.26	0.66	0.65	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 55 (69%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 23.7 Intersection LOS: C
Intersection Capacity Utilization 52.0% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 29: Avenue 18 1/2 & Golden State Blvd / Road 23



ATTACHMENT VI – C - 41

EXISTING (2005) CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

INTERSECTION LEVEL OF SERVICE CALCULATIONS

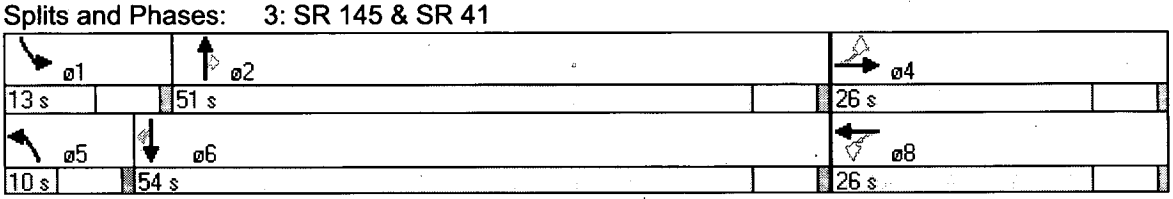
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939			0.967				0.850			0.850
Flt Protected		0.989			0.989		0.950			0.950		
Satd. Flow (prot)	0	1634	0	0	1637	0	1687	1776	1509	1770	1863	1583
Flt Permitted		0.911			0.920		0.950			0.950		
Satd. Flow (perm)	0	1505	0	0	1523	0	1687	1776	1509	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		43			17				15			132
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	36	50	70	21	50	23	31	183	13	30	727	116
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	11%	11%	11%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	41	57	80	24	57	26	35	208	15	34	826	132
Lane Group Flow (vph)	0	178	0	0	107	0	35	208	15	34	826	132
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	26.0	26.0	0.0	26.0	26.0	0.0	10.0	51.0	51.0	13.0	54.0	54.0
Total Split (%)	28.9%	28.9%	0.0%	28.9%	28.9%	0.0%	11.1%	56.7%	56.7%	14.4%	60.0%	60.0%
Maximum Green (s)	20.0	20.0		20.0	20.0		4.0	45.0	45.0	7.0	48.0	48.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		14.7			14.7		6.0	52.2	52.2	8.5	54.0	54.0
Actuated g/C Ratio		0.18			0.18		0.07	0.63	0.63	0.10	0.65	0.65
v/c Ratio		0.59			0.37		0.30	0.19	0.02	0.20	0.68	0.12
Control Delay		30.7			27.9		45.3	9.2	4.9	38.6	15.1	2.0
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		30.7			27.9		45.3	9.2	4.9	38.6	15.1	2.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			C		D	A	A	D	B	A
Approach Delay		30.7			27.9			13.8			14.2	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		64			41		18	49	0	16	277	0
Queue Length 95th (ft)		122			84		48	98	9	46	497	22
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		403			388		117	1124	961	182	1218	1081
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.44			0.28		0.30	0.19	0.02	0.19	0.68	0.12

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 82.5
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 57.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: SR 145 & SR 41



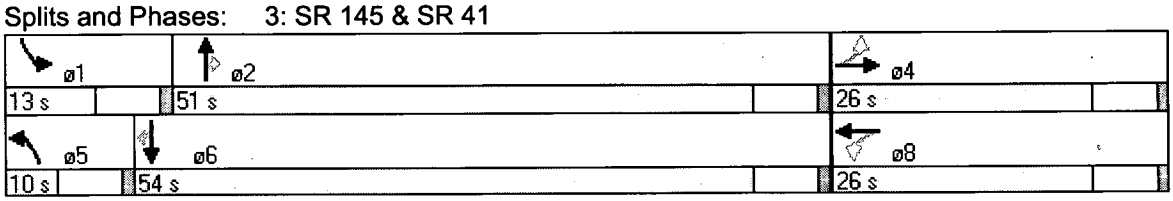
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.943				0.850			0.850
Flt Protected		0.973			0.992		0.950			0.950		
Satd. Flow (prot)	0	1705	0	0	1546	0	1770	1863	1583	1770	1863	1583
Flt Permitted		0.705			0.925		0.950			0.950		
Satd. Flow (perm)	0	1236	0	0	1441	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			39				31			53
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	124	77	22	21	50	52	48	633	27	19	554	47
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	7%	15%	15%	15%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	141	88	25	24	57	59	55	719	31	22	630	53
Lane Group Flow (vph)	0	254	0	0	140	0	55	719	31	22	630	53
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	26.0	26.0	0.0	26.0	26.0	0.0	10.0	51.0	51.0	13.0	54.0	54.0
Total Split (%)	28.9%	28.9%	0.0%	28.9%	28.9%	0.0%	11.1%	56.7%	56.7%	14.4%	60.0%	60.0%
Maximum Green (s)	20.0	20.0		20.0	20.0		4.0	45.0	45.0	7.0	48.0	48.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		20.7			20.7		6.0	53.9	53.9	8.4	51.2	51.2
Actuated g/C Ratio		0.24			0.24		0.07	0.61	0.61	0.09	0.58	0.58
v/c Ratio		0.86			0.38		0.47	0.63	0.03	0.14	0.58	0.06
Control Delay		58.9			23.6		53.7	15.7	4.0	40.8	15.3	2.9
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		58.9			23.6		53.7	15.7	4.0	40.8	15.3	2.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E			C		D	B	A	D	B	A
Approach Delay		58.9			23.6			17.9			15.2	
Approach LOS		E			C			B			B	
Queue Length 50th (ft)		134			47		31	195	0	12	225	0
Queue Length 95th (ft)		#258			97		67	427	13	33	320	15
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		311			386		118	1145	985	168	1087	946
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.82			0.36		0.47	0.63	0.03	0.13	0.58	0.06

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 87.7
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 22.8 Intersection LOS: C
Intersection Capacity Utilization 65.5% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description 04-837.1 Alt D

East/West Street: Northfork Road / Road 200 | North/South Street: SR 41

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		230	36	41	700	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	117	0	27
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				103		24
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	46	795	0	0	261	40
Percent Heavy Vehicles	0	0	0	7	0	7
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		46		144				
C (m) (veh/h)		1249		240				
v/c		0.04		0.60				
95% queue length		0.11		3.49				
Control Delay (s/veh)		8.0		40.2				
LOS		A		E				
Approach Delay (s/veh)	--	--	40.2					
Approach LOS	--	--	E					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Alt D	
East/West Street: Northfork Road / Road 200	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		753	81	27	404	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	36	0	40
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				32		36
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	30	459	0	0	855	92
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		30		76				
C (m) (veh/h)		721		219				
v/c		0.04		0.35				
95% queue length		0.13		1.47				
Control Delay (s/veh)		10.2		29.9				
LOS		B		D				
Approach Delay (s/veh)	--	--	29.9					
Approach LOS	--	--	D					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description 04-837.1 Alt D

East/West Street: Thornberry Road / Road 420 | North/South Street: SR 41

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		592	8	22	375	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	42	0	34
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				37		30
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	25	426	0	0	672	9
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		25		76				
C (m) (veh/h)		901		352				
v/c		0.03		0.22				
95% queue length		0.09		0.81				
Control Delay (s/veh)		9.1		18.0				
LOS		A		C				
Approach Delay (s/veh)	--	--	18.0					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Alt D	
East/West Street: Thornberry Road / Road 420	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		573	13	29	584	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	19
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				9		17
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	32	663	0	0	651	14
Percent Heavy Vehicles	0	0	0	4	0	4
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		32		29				
C (m) (veh/h)		920		379				
v/c		0.03		0.08				
95% queue length		0.11		0.25				
Control Delay (s/veh)		9.1		15.3				
LOS		A		C				
Approach Delay (s/veh)	--	--	15.3					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

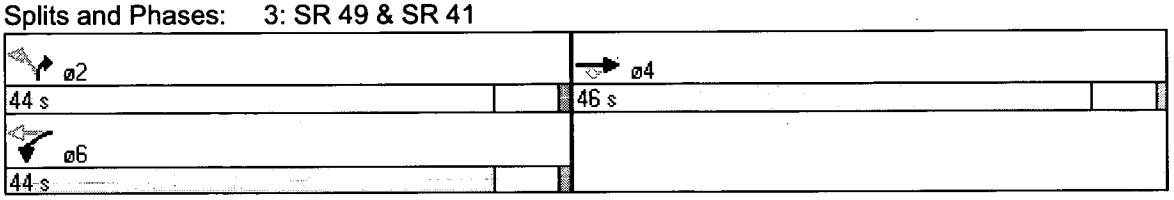
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1792	1524	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1792	1524	1719	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		301				593
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	99	515	388	341	119	522
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	6%	6%	5%	5%	5%	5%
Adj. Flow (vph)	112	585	441	388	135	593
Lane Group Flow (vph)	112	585	441	388	135	593
Turn Type		Perm	Prot			custom
Protected Phases	4		6!			2
Permitted Phases		4		6	2!	
Detector Phases	4	4	6	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	46.0	46.0	44.0	44.0	44.0	44.0
Total Split (%)	51.1%	51.1%	48.9%	48.9%	48.9%	48.9%
Maximum Green (s)	40.0	40.0	38.0	38.0	38.0	38.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	19.8	19.8	21.3	21.3	21.3	21.3
Actuated g/C Ratio	0.39	0.39	0.42	0.42	0.42	0.42
v/c Ratio	0.16	0.75	0.61	0.51	0.19	0.60
Control Delay	11.7	13.7	17.4	15.3	12.2	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	13.7	17.4	15.3	12.2	4.3
LOS	B	B	B	B	B	A
Approach Delay	13.3			16.4	5.8	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	B			B	A	
Queue Length 50th (ft)	18	52	83	69	21	0
Queue Length 95th (ft)	63	220	269	225	79	52
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	1071	1032	1024	1078	1024	1156
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.57	0.43	0.36	0.13	0.51

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 50.9
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 12.0 Intersection LOS: B
Intersection Capacity Utilization 60.1% ICU Level of Service B
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 3: SR 49 & SR 41



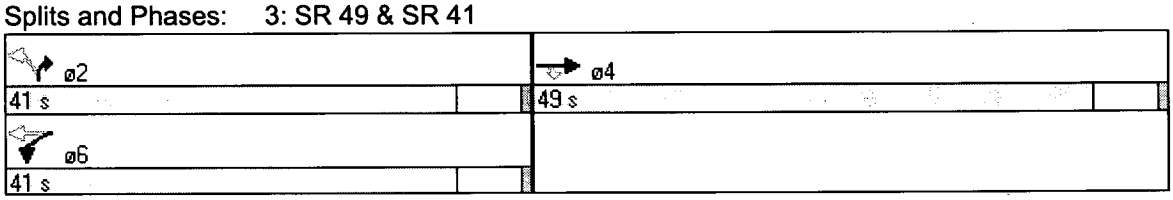
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		206				612
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	151	637	462	495	220	539
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	172	724	525	562	250	612
Lane Group Flow (vph)	172	724	525	562	250	612
Turn Type		Perm	Prot			custom
Protected Phases	4		6!			2
Permitted Phases		4		6	2!	
Detector Phases	4	4	6	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	49.0	49.0	41.0	41.0	41.0	41.0
Total Split (%)	54.4%	54.4%	45.6%	45.6%	45.6%	45.6%
Maximum Green (s)	43.0	43.0	35.0	35.0	35.0	35.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	31.2	31.2	26.9	26.9	26.9	26.9
Actuated g/C Ratio	0.46	0.46	0.40	0.40	0.40	0.40
v/c Ratio	0.20	0.86	0.74	0.76	0.35	0.61
Control Delay	12.3	23.8	26.7	26.8	17.8	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	23.8	26.7	26.8	17.8	4.6
LOS	B	C	C	C	B	A
Approach Delay	21.6			26.7	8.4	
Approach LOS	C			C	A	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	43	199	196	211	76	0
Queue Length 95th (ft)	86	397	353	377	150	55
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	1061	990	875	920	875	1092
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.73	0.60	0.61	0.29	0.56

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 67.5
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.6 Intersection LOS: B
Intersection Capacity Utilization 71.7% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 3: SR 49 & SR 41



ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	AM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2005

Project ID 04-837.1 Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	38	27	87	33	50	30
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	44	16	15	3	14	19
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	73	87	93	34	68	15	18	21
% Heavy Vehicles	2	0	3	3	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.6	0.0	0.4	0.0	0.7	0.0	0.2	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.3	-0.7	0.2	-0.6	0.4	-0.7	0.1	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.06	0.08	0.08	0.03	0.06	0.01	0.02	0.02
hd, final value (s)	5.26	4.23	5.20	4.30	5.60	4.50	5.37	4.59
x, final value	0.11	0.10	0.13	0.04	0.11	0.02	0.03	0.03
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.0	1.9	2.9	2.0	3.3	2.2	3.1	2.3

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	323	337	343	284	318	265	268	271
Delay (s/veh)	8.58	7.41	8.70	7.18	8.97	7.29	8.22	7.41
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	7.94		8.30		8.66		7.78	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.18							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	PM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2005

Project ID 04-837.1 Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	32	78	44	7	40	19
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	46	4	6	24	6	58
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LT	R	LTR		LT	R
PHF	0.88		0.88	0.88	0.88		0.88	0.88
Flow Rate (veh/h)	174		52	21	62		33	65
% Heavy Vehicles	2		2	2	2		2	2
No. Lanes	1		2		1		2	
Geometry Group	4b		5		4b		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1	0.0	0.8		0.8	0.0
Prop. Right-Turns	0.3		0.0	1.0	0.1		0.0	1.0
Prop. Heavy Vehicle	0.0		0.0	0.0	0.0		0.0	0.0
hLT-adj	0.2	0.2	0.5	0.5	0.2	0.2	0.5	0.5
hRT-adj	-0.6	-0.6	-0.7	-0.7	-0.6	-0.6	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		0.1	-0.7	0.1		0.4	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20	3.20	3.20		3.20	3.20
x, initial	0.15		0.05	0.02	0.06		0.03	0.06
hd, final value (s)	4.91		5.18	4.41	5.39		5.64	4.52
x, final value	0.24		0.07	0.03	0.09		0.05	0.08
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	2.6		2.9	2.1	3.1		3.3	2.2

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	424		302	271	312		283	315
Delay (s/veh)	9.13		8.30	7.23	8.65		8.64	7.63
LOS	A		A	A	A		A	A
Approach: Delay (s/veh)	9.13		7.99		8.65		7.97	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.57							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description 04-837.1 Alt D	
East/West Street: Cascadel Road	North/South Street: Mammoth Pool Rd / Rd 225
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		56	1	12	6	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	1	0	36
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				1		32
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	13	6	0	0	63	1
Percent Heavy Vehicles	0	0	0	3	0	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		13	1		36			
C (m) (veh/h)		1538	893		998			
v/c		0.01	0.00		0.04			
95% queue length		0.03	0.00		0.11			
Control Delay (s/veh)		7.4	9.0		8.7			
LOS		A	A		A			
Approach Delay (s/veh)	--	--	8.8					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Alt D	
East/West Street: Cascadel Road	North/South Street: Mammoth Pool Rd / Rd 225
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		24	1	27	45	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	1	0	26
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				1		23
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	30	51	0	0	27	1
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		30	1		26			
C (m) (veh/h)		1579	824		1030			
v/c		0.02	0.00		0.03			
95% queue length		0.06	0.00		0.08			
Control Delay (s/veh)		7.3	9.4		8.6			
LOS		A	A		A			
Approach Delay (s/veh)	--	--	8.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description	04-837.1 Alt D
East/West Street: Cascadel Road	North/South Street: Mission Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		10	7	1	27	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	11	7	1	30	0
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	6		1			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	6	0	1	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		1		7				
C (m) (veh/h)		1586		976				
v/c		0.00		0.01				
95% queue length		0.00		0.02				
Control Delay (s/veh)		7.3		8.7				
LOS		A		A				
Approach Delay (s/veh)	--	--	8.7					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*W Hutcheson*	Intersection	*Cascadel Rd @ Mission Dr*
Agency/Co.	*TPG Consulting*	Jurisdiction	*Madera County*
Date Performed	*8/26/2005*	Analysis Year	*2005*
Analysis Time Period	*PM*		

Project Description *04-837.1 Alt D*

East/West Street: *Cascadel Road* | North/South Street: *Mission Drive*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		26	4	1	20	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	29	4	1	22	0
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3		1			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	3	0	1	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		1		4				
C (m) (veh/h)		1579		973				
v/c		0.00		0.00				
95% queue length		0.00		0.01				
Control Delay (s/veh)		7.3		8.7				
LOS		A		A				
Approach Delay (s/veh)	--	--	8.7					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2005
Analysis Time Period	AM		

Project Description 04-837.1 Alt D

East/West Street: Auberry Rd | North/South Street: Northfork Rd / Rd 200

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	124	11	14	78	5
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	1	1	1	5	1	19
Percent Heavy Vehicles	5	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	5	1	17
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	15	88	5	3	140	12
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	3	15		25			3	
C (m) (veh/h)	1483	1411		836			717	
v/c	0.00	0.01		0.03			0.00	
95% queue length	0.01	0.03		0.09			0.01	
Control Delay (s/veh)	7.4	7.6		9.4			10.0	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--	9.4			10.0		
Approach LOS	--	--	A			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	W Hutcheson	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2005
Analysis Time Period	PM		

Project Description 04-837.1 Alt D	
East/West Street: Auberry Rd	North/South Street: Northfork Rd / Rd 200
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	93	10	24	117	3
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	3	1	5	15	1	19
Percent Heavy Vehicles	5	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	1	5	14	1	17
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	27	132	3	3	105	11
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	3	27		35			9	
C (m) (veh/h)	1431	1473		772			749	
v/c	0.00	0.02		0.05			0.01	
95% queue length	0.01	0.06		0.14			0.04	
Control Delay (s/veh)	7.5	7.5		9.9			9.9	
LOS	A	A		A			A	
Approach Delay (s/veh)	--	--	9.9			9.9		
Approach LOS	--	--	A			A		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Northfork Rd @ Crane Valley Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/2/06	Analysis Year	2005
Analysis Time Period	AM		

Project Description	04-837.1 Alt D
East/West Street: Northfork Rd / Rd 200	North/South Street: Crane (SB) / Northfork (NB)
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	73	13			18	52
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	82	14	0	0	20	59
Percent Heavy Vehicles	0	–	–	6	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				14		65
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	15	0	73
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	82						88	
C (m) (veh/h)	1532						955	
v/c	0.05						0.09	
95% queue length	0.17						0.30	
Control Delay (s/veh)	7.5						9.2	
LOS	A						A	
Approach Delay (s/veh)	–	–				9.2		
Approach LOS	–	–				A		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	PM

Site Information

Intersection	Northfork Rd @ Crane Valley Rd
Jurisdiction	Madera County
Analysis Year	2005

Project Description 04-837.1 Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	94	18			18	18
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	106	20	0	0	20	20
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				40		100
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	45	0	113
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	106						158	
C (m) (veh/h)	1583						908	
v/c	0.07						0.17	
95% queue length	0.22						0.63	
Control Delay (s/veh)	7.4						9.8	
LOS	A						A	
Approach Delay (s/veh)	--	--				9.8		
Approach LOS	--	--				A		

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 42

EXISTING (2005) CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR 41 Critical Approach Speed 55 mph

MINOR STREET: ROAD 200 Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

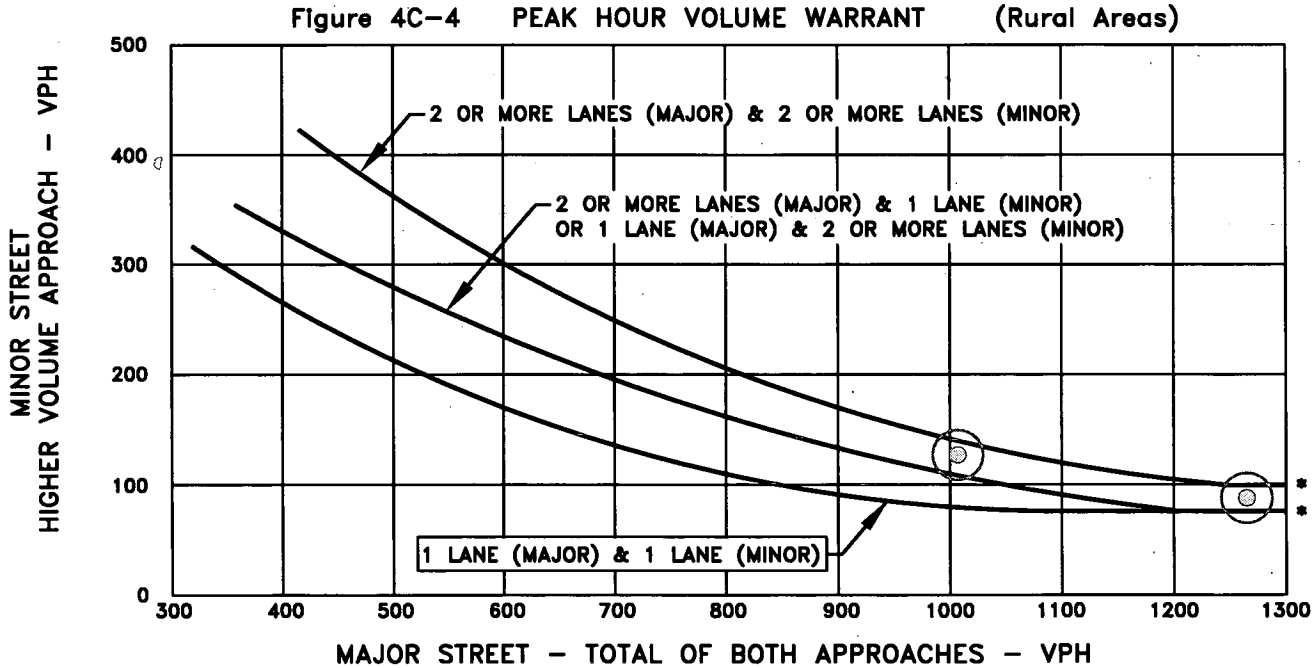
CONDITION: EXISTING ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		1007	1265				
Highest Approaches – Minor Street	✓		127	68				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR 41 Critical Approach Speed 55 mph

MINOR STREET: THORNBERRY ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

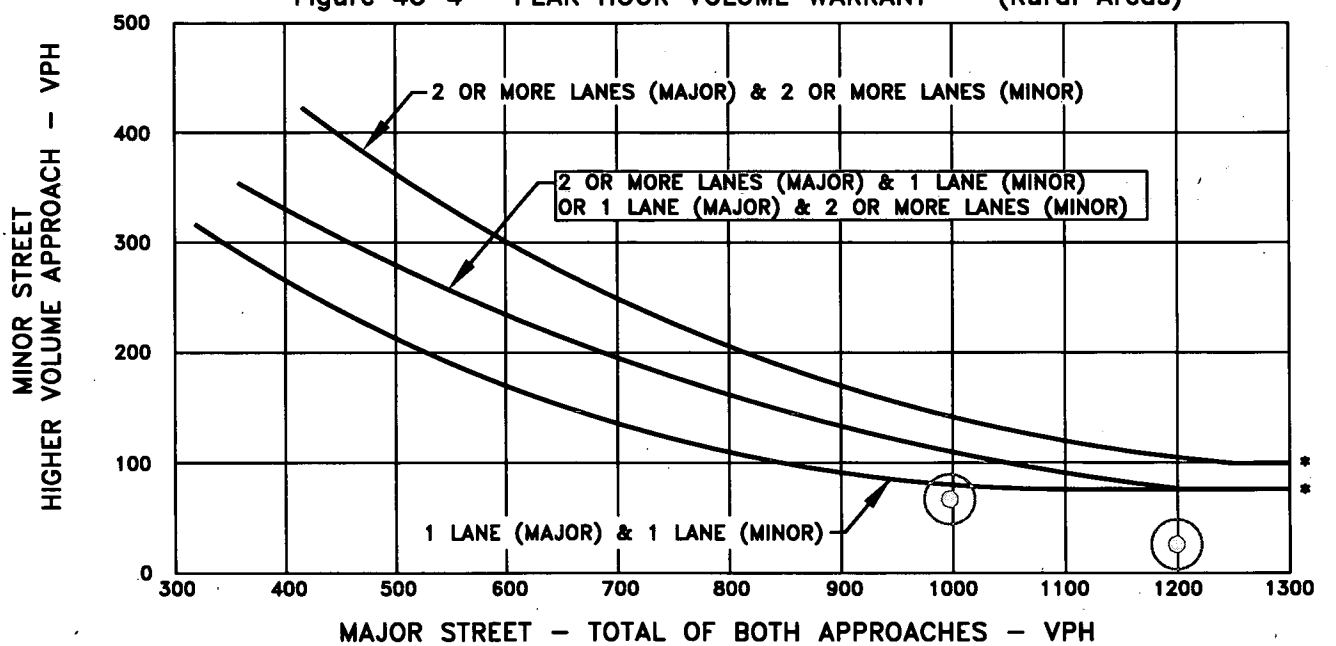
CONDITION: EXISTING ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street		✓	997	1199				
Highest Approaches – Minor Street	✓		67	26				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: MALUM RIDGE ROAD Critical Approach Speed 55/25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

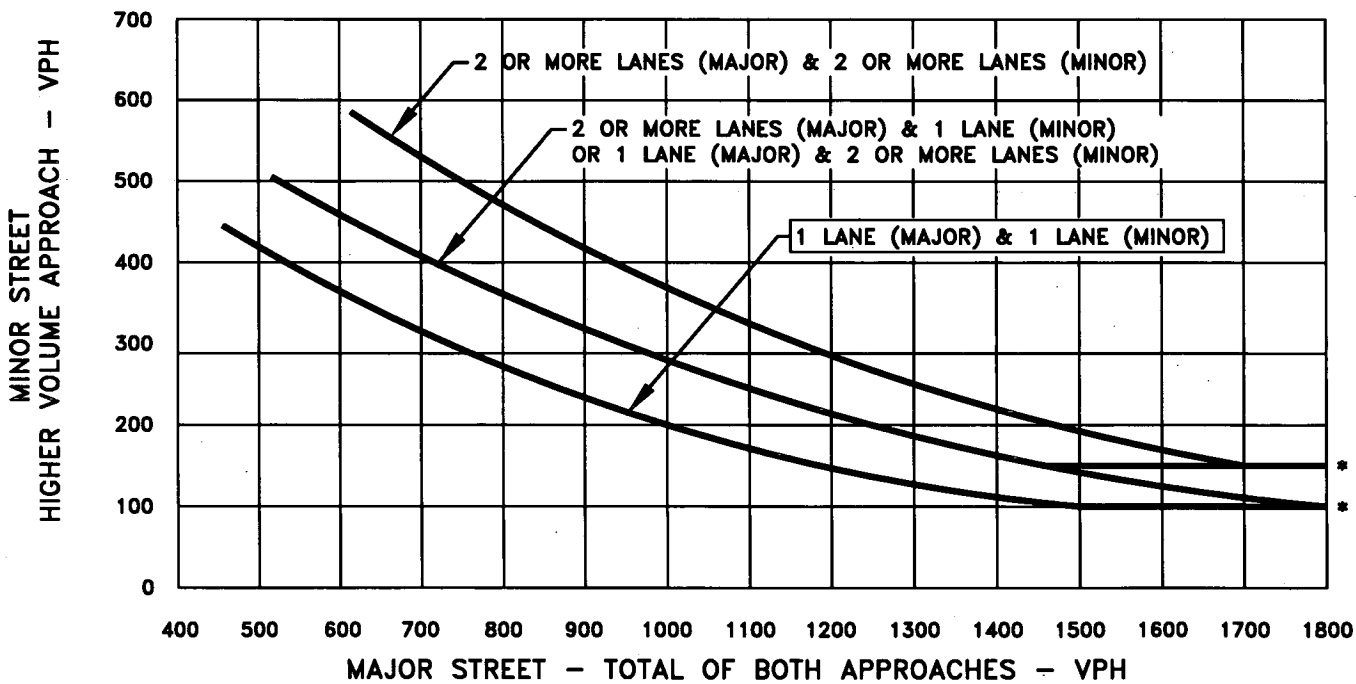
CONDITION: EXISTING ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		265	220			
Highest Approaches – Minor Street	✓		75	88			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

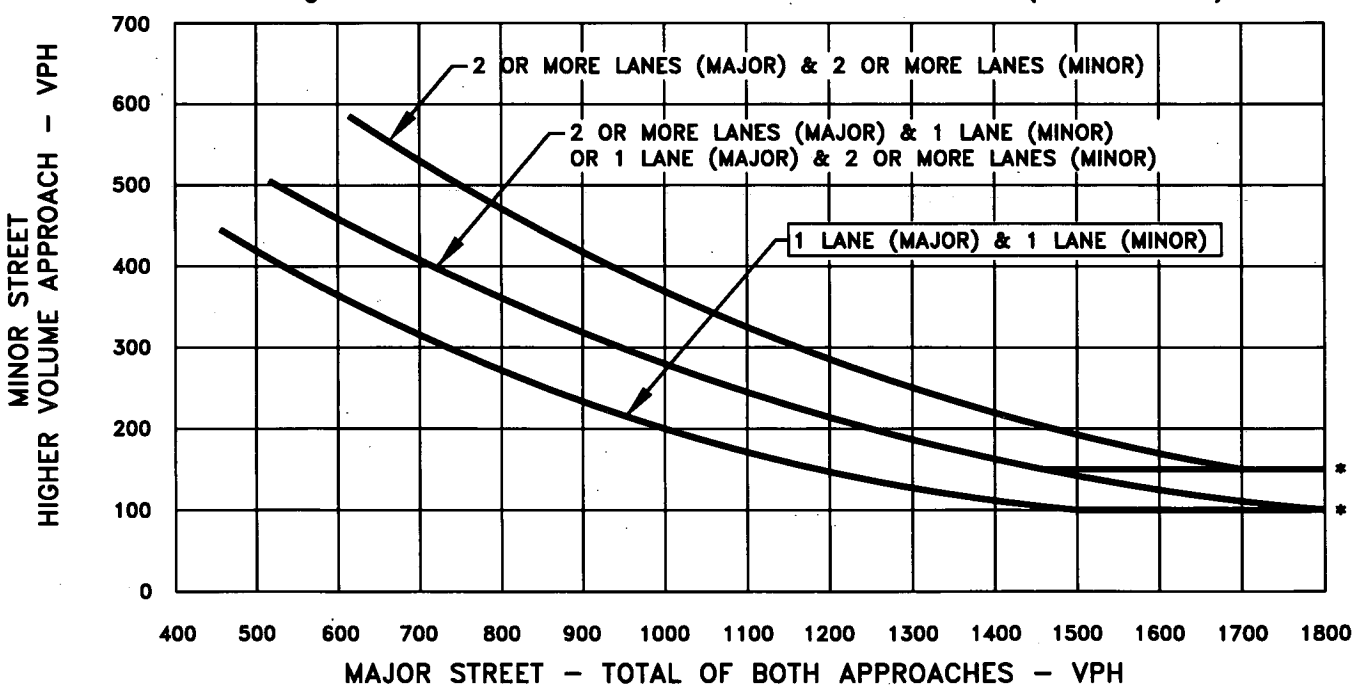
CONDITION: EXISTING ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		75	96			
Highest Approaches – Minor Street	✓		33	24			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

MINOR STREET: MISSION DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

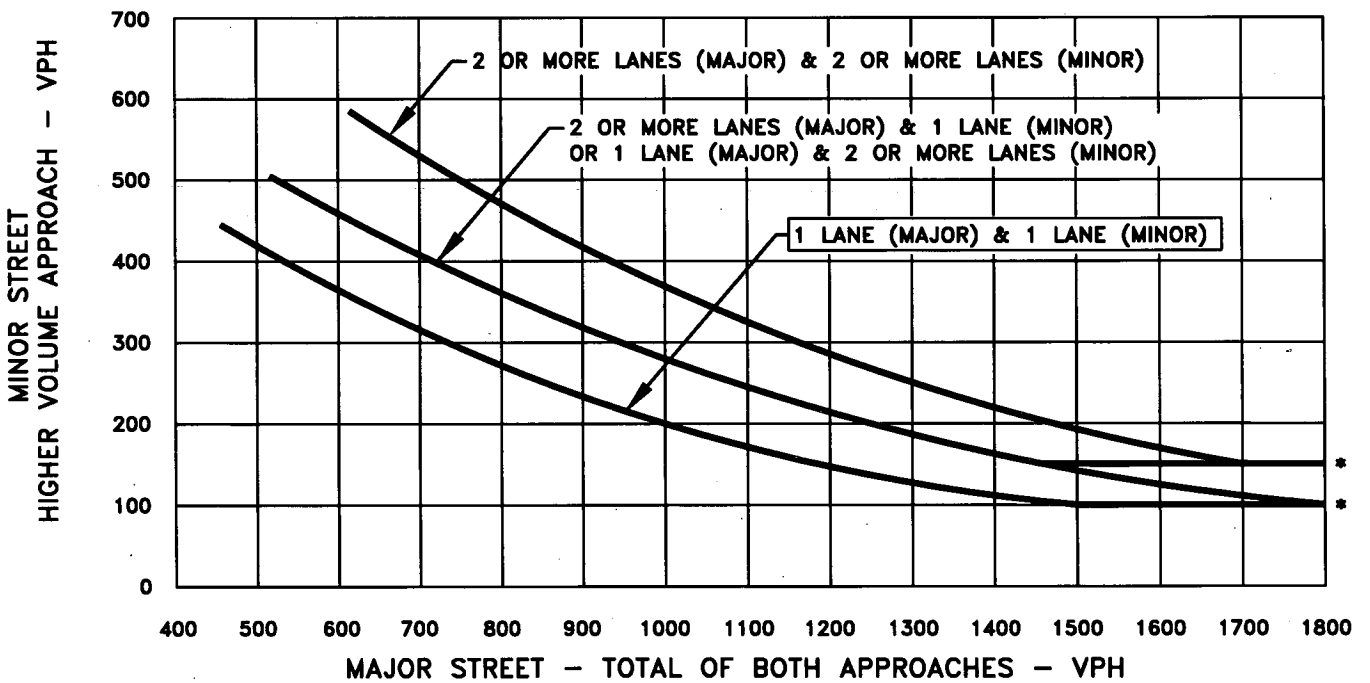
CONDITION: EXISTING ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		44	50			
Highest Approaches – Minor Street	✓		6	3			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: AUBERRY ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

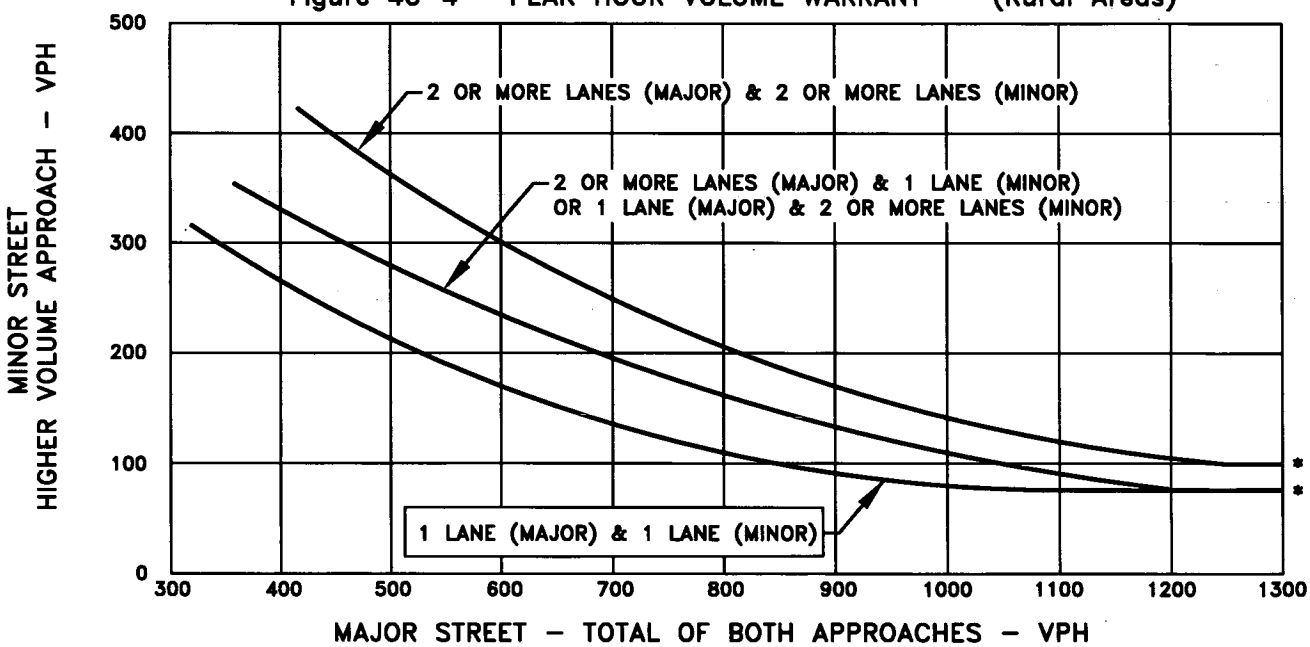
CONDITION: EXISTING ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		235	250				
Highest Approaches – Minor Street	✓		22	31				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: CRANE VALLEY ROAD Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- ☒ RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- ☐

☐ URBAN (U)

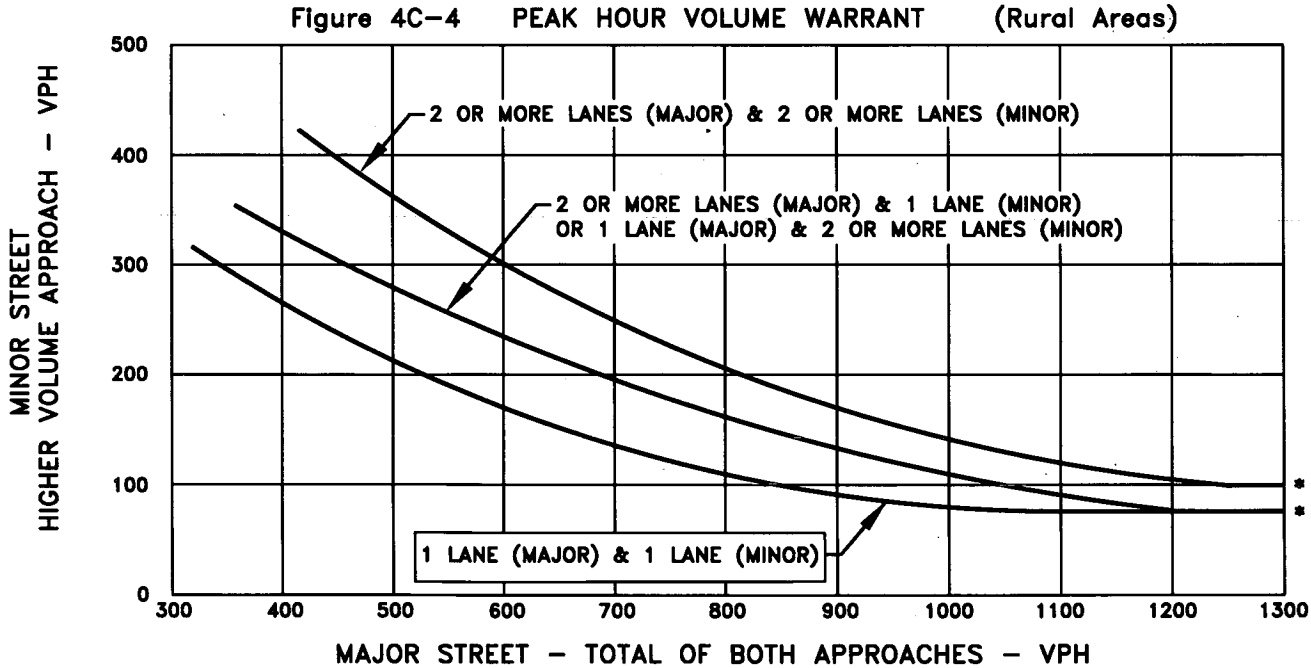
CONDITION: EXISTING ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		165	252				
Highest Approaches – Minor Street	✓		70	36				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

ATTACHMENT VI – C - 43

OPENING DAY (2008) NO PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948			0.963				0.850			0.850
Flt Protected		0.989			0.989		0.950			0.950		
Satd. Flow (prot)	0	1649	0	0	1630	0	1687	1776	1509	1770	1863	1583
Flt Permitted		0.896			0.887		0.950			0.950		
Satd. Flow (perm)	0	1494	0	0	1462	0	1687	1776	1509	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			22				23			141
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	43	72	73	29	70	37	35	242	20	44	784	124
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	11%	11%	11%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	49	82	83	33	80	42	40	275	23	50	891	141
Lane Group Flow (vph)	0	214	0	0	155	0	40	275	23	50	891	141
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	22.0	22.0	0.0	22.0	22.0	0.0	10.0	48.0	48.0	10.0	48.0	48.0
Total Split (%)	27.5%	27.5%	0.0%	27.5%	27.5%	0.0%	12.5%	60.0%	60.0%	12.5%	60.0%	60.0%
Maximum Green (s)	16.0	16.0		16.0	16.0		4.0	42.0	42.0	4.0	42.0	42.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		14.8			14.8		6.0	46.3	46.3	6.0	46.3	46.3
Actuated g/C Ratio		0.20			0.20		0.08	0.62	0.62	0.08	0.62	0.62
v/c Ratio		0.66			0.51		0.31	0.25	0.02	0.37	0.77	0.14
Control Delay		33.1			29.0		41.5	8.8	3.7	43.1	19.1	2.1
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		33.1			29.0		41.5	8.8	3.7	43.1	19.1	2.1

J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			C		D	A	A	D	B	A
Approach Delay		33.1			29.0			12.3			18.0	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		79			57		19	65	0	24	339	0
Queue Length 95th (ft)		144			110		49	109	9	57	#593	22
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		375			356		129	1101	944	135	1154	1034
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.57			0.44		0.31	0.25	0.02	0.37	0.77	0.14

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74.8
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 62.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41

ø1	ø2	ø4
10 s	48 s	22 s
ø5	ø6	ø8
10 s	48 s	22 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.943				0.850			0.850
Flt Protected		0.975			0.992		0.950			0.950		
Satd. Flow (prot)	0	1711	0	0	1546	0	1770	1863	1583	1770	1863	1583
Flt Permitted		0.689			0.921		0.950			0.950		
Satd. Flow (perm)	0	1209	0	0	1435	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			46				42			62
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	130	103	22	27	69	70	53	690	37	27	616	55
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	7%	15%	15%	15%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	148	117	25	31	78	80	60	784	42	31	700	62
Lane Group Flow (vph)	0	290	0	0	189	0	60	784	42	31	700	62
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	27.0	27.0	0.0	27.0	27.0	0.0	10.0	43.0	43.0	10.0	43.0	43.0
Total Split (%)	33.8%	33.8%	0.0%	33.8%	33.8%	0.0%	12.5%	53.8%	53.8%	12.5%	53.8%	53.8%
Maximum Green (s)	21.0	21.0		21.0	21.0		4.0	37.0	37.0	4.0	37.0	37.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		21.3			21.3		6.0	43.6	43.6	6.0	39.8	39.8
Actuated g/C Ratio		0.28			0.28		0.08	0.57	0.57	0.07	0.52	0.52
v/c Ratio		0.85			0.44		0.44	0.74	0.05	0.24	0.73	0.07
Control Delay		51.0			21.0		46.4	20.3	3.9	41.0	21.4	3.5
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		51.0			21.0		46.4	20.3	3.9	41.0	21.4	3.5

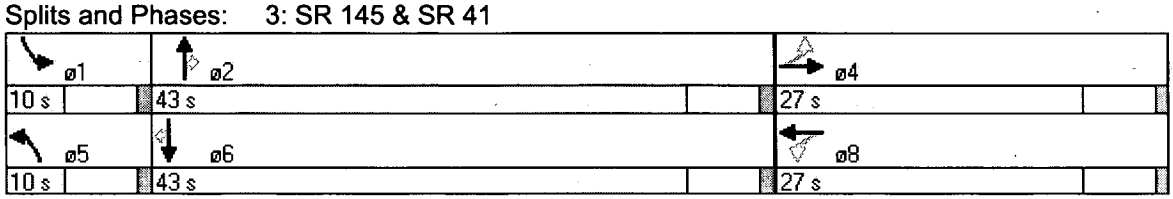
J. Gormley
TPG Consulting, Inc.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D			C		D	C	A	D	C	A
Approach Delay		51.0			21.0			21.3			20.8	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)		132			56		29	236	0	15	272	0
Queue Length 95th (ft)		#258			111		65	#536	15	40	399	18
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		360			454		135	1057	917	129	964	849
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.81			0.42		0.44	0.74	0.05	0.24	0.73	0.07

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 76.8
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 25.1 Intersection LOS: C
Intersection Capacity Utilization 76.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Road / Road 200 | North/South Street: SR 41

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		300	48	49	766	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	134	0	32
Percent Heavy Vehicles	0	–	–	4	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				118		29
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	55	870	0	0	340	54
Percent Heavy Vehicles	0	0	0	7	0	7
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		55		166				
C (m) (veh/h)		1154		189				
v/c		0.05		0.88				
95% queue length		0.15		6.58				
Control Delay (s/veh)		8.3		87.7				
LOS		A		F				
Approach Delay (s/veh)	--	--	87.7					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Northfork Road / Road 200	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		818	95	33	475	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	47	0	52
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				42		46
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	37	539	0	0	929	107
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		37		99				
C (m) (veh/h)		667		179				
v/c		0.06		0.55				
95% queue length		0.18		2.88				
Control Delay (s/veh)		10.7		47.5				
LOS		B		E				
Approach Delay (s/veh)	--	--	47.5					
Approach LOS	--	--	E					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Thornberry Road / Road 420	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		667	9	29	447	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	46	0	38
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				41		34
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	32	507	0	0	757	10
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		32		84				
C (m) (veh/h)		836		293				
v/c		0.04		0.29				
95% queue length		0.12		1.15				
Control Delay (s/veh)		9.5		22.2				
LOS		A		C				
Approach Delay (s/veh)	--	--	22.2					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Thornberry Road / Road 420	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		647	15	35	657	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	13	0	25
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				12		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	39	746	0	0	735	17
Percent Heavy Vehicles	0	0	0	4	0	4
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		39		38				
C (m) (veh/h)		853		322				
v/c		0.05		0.12				
95% queue length		0.14		0.40				
Control Delay (s/veh)		9.4		17.7				
LOS		A		C				
Approach Delay (s/veh)	--	--	17.7					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1792	1524	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1792	1524	1719	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		548				674
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	105	552	434	371	132	593
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	6%	6%	5%	5%	5%	5%
Adj. Flow (vph)	119	627	493	422	150	674
Lane Group Flow (vph)	119	627	493	422	150	674
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases	4	4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	24.0	24.0	32.0	56.0	24.0	24.0
Total Split (%)	30.0%	30.0%	40.0%	70.0%	30.0%	30.0%
Maximum Green (s)	18.0	18.0	26.0	50.0	18.0	18.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	14.1	14.1	23.1	41.0	13.6	13.6
Actuated g/C Ratio	0.22	0.22	0.36	0.64	0.21	0.21
v/c Ratio	0.30	0.82	0.79	0.36	0.41	0.78
Control Delay	25.2	15.0	30.9	6.7	27.7	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	15.0	30.9	6.7	27.7	10.0
LOS	C	B	C	A	C	A
Approach Delay	16.7			19.7	13.2	

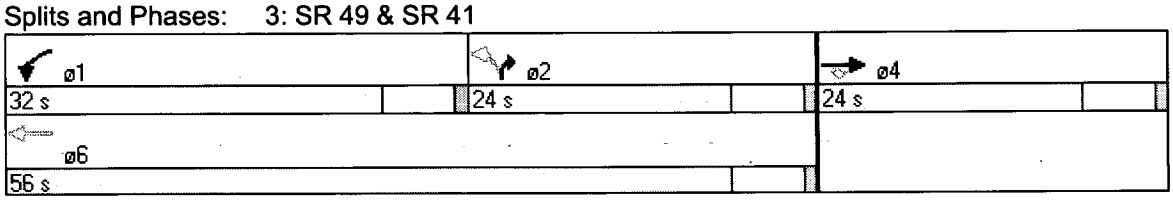
J. Gormley
TPG Consulting, Inc.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	B			B	B	
Queue Length 50th (ft)	42	27	167	64	55	0
Queue Length 95th (ft)	89	#150	#368	128	110	81
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	531	837	718	1270	506	928
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.75	0.69	0.33	0.30	0.73

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 63.6
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 16.6 Intersection LOS: B
Intersection Capacity Utilization 64.9% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



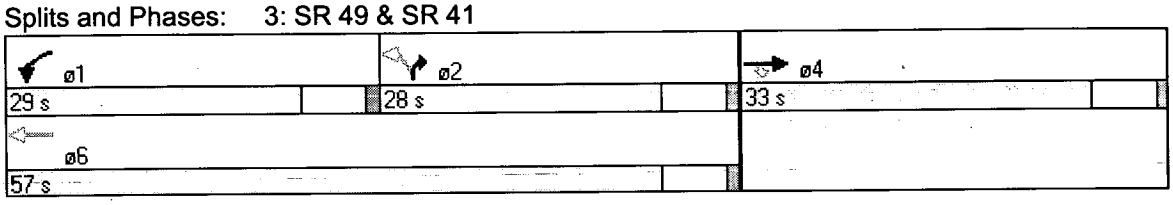
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		595				806
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	58	775	407	628	130	709
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	66	881	462	714	148	806
Lane Group Flow (vph)	66	881	462	714	148	806
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases		4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	33.0	33.0	29.0	57.0	28.0	28.0
Total Split (%)	36.7%	36.7%	32.2%	63.3%	31.1%	31.1%
Maximum Green (s)	27.0	27.0	23.0	51.0	22.0	22.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	26.8	26.8	24.0	43.7	15.6	15.6
Actuated g/C Ratio	0.34	0.34	0.30	0.56	0.20	0.20
v/c Ratio	0.10	0.95	0.86	0.69	0.42	0.84
Control Delay	20.2	29.3	45.3	17.1	32.1	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	29.3	45.3	17.1	32.1	11.5
LOS	C	C	D	B	C	B
Approach Delay	28.7			28.2	14.7	
Approach LOS	C			C	B	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	22	150	217	249	67	0
Queue Length 95th (ft)	55	#457	#428	354	117	90
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	674	953	562	1126	493	1022
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.92	0.82	0.63	0.30	0.79

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 78.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 24.2 Intersection LOS: C
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 No Project AM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	41	37	94	36	59	33
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	48	16	19	4	16	24
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	88	94	107	37	72	19	22	27
% Heavy Vehicles	2	0	3	3	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.5	0.0	0.4	0.0	0.8	0.0	0.2	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.3	-0.7	0.2	-0.6	0.4	-0.7	0.1	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.08	0.08	0.10	0.03	0.06	0.02	0.02	0.02
hd, final value (s)	5.29	4.30	5.26	4.38	5.72	4.61	5.49	4.70
x, final value	0.13	0.11	0.16	0.04	0.11	0.02	0.03	0.04
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.0	2.0	3.0	2.1	3.4	2.3	3.2	2.4

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	338	344	357	287	322	269	272	277
Delay (s/veh)	8.78	7.54	8.94	7.28	9.16	7.42	8.38	7.57
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	8.14		8.51		8.79		7.93	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.36							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 No Project PM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	36	90	48	8	50	24
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	4	6	27	6	64
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LT	R	LTR		LT	R
PHF	0.88		0.88	0.88	0.88		0.88	0.88
Flow Rate (veh/h)	196		65	27	67		36	72
% Heavy Vehicles	2		2	2	2		2	2
No. Lanes	1		2		1		2	
Geometry Group	4b		5		4b		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1	0.0	0.9		0.8	0.0
Prop. Right-Turns	0.3		0.0	1.0	0.1		0.0	1.0
Prop. Heavy Vehicle	0.0		0.0	0.0	0.0		0.0	0.0
hLT-adj	0.2	0.2	0.5	0.5	0.2	0.2	0.5	0.5
hRT-adj	-0.6	-0.6	-0.7	-0.7	-0.6	-0.6	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		0.1	-0.7	0.2		0.5	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20	3.20	3.20		3.20	3.20
x, initial	0.17		0.06	0.02	0.06		0.03	0.06
hd, final value (s)	4.99		5.26	4.49	5.53		5.77	4.65
x, final value	0.27		0.09	0.03	0.10		0.06	0.09
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	2.7		3.0	2.2	3.2		3.5	2.3

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	446		315	277	317		286	322
Delay (s/veh)	9.54		8.51	7.34	8.87		8.82	7.82
LOS	A		A	A	A		A	A
Approach: Delay (s/veh)	9.54		8.17		8.87		8.15	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.85							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mammoth Pool Rd / Rd 225
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		63	1	13	12	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	2	0	38
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				2		34
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	14	13	0	0	71	1
Percent Heavy Vehicles	0	0	0	3	0	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		14	2		38			
C (m) (veh/h)		1528	873		987			
v/c		0.01	0.00		0.04			
95% queue length		0.03	0.01		0.12			
Control Delay (s/veh)		7.4	9.1		8.8			
LOS		A	A		A			
Approach Delay (s/veh)	–	–	8.8					
Approach LOS	–	–	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road | North/South Street: Mammoth Pool Rd / Rd 225

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		29	1	28	52	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	1	0	28
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				1		25
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	31	59	0	0	32	1
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		31	1		28			
C (m) (veh/h)		1572	809		1025			
v/c		0.02	0.00		0.03			
95% queue length		0.06	0.00		0.08			
Control Delay (s/veh)		7.3	9.5		8.6			
LOS		A	A		A			
Approach Delay (s/veh)	--	--	8.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road | North/South Street: Mission Drive

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		11	0	0	30	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	12	0	0	34	0
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	7		0			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	7	0	0	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		0		7				
C (m) (veh/h)		1594		964				
v/c		0.00		0.01				
95% queue length		0.00		0.02				
Control Delay (s/veh)		7.3		8.8				
LOS		A		A				
Approach Delay (s/veh)	--	--	8.8					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mission Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		29	5	0	23	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	32	5	0	26	0
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0		0			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		0		0				
C (m) (veh/h)		1574						
v/c		0.00						
95% queue length		0.00						
Control Delay (s/veh)		7.3						
LOS		A						
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 No Project AM

Site Information

Intersection	Northfork Rd @ Crane Valley Rd
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	76	18			22	57
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	86	20	0	0	25	64
Percent Heavy Vehicles	0	–	–	6	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				18		70
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	20	0	79
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	86						99	
C (m) (veh/h)	1519						929	
v/c	0.06						0.11	
95% queue length	0.18						0.36	
Control Delay (s/veh)	7.5						9.3	
LOS	A						A	
Approach Delay (s/veh)	–	–				9.3		
Approach LOS	–	–				A		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2008
Analysis Time Period	2008 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd | North/South Street: Northfork Rd / Rd 200

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	136	13	14	92	4
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	1	1	1	6	1	19
Percent Heavy Vehicles	5	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	6	1	17
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	15	104	4	3	154	14
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	3	15		26			3	
C (m) (veh/h)	1464	1392		807			690	
v/c	0.00	0.01		0.03			0.00	
95% queue length	0.01	0.03		0.10			0.01	
Control Delay (s/veh)	7.5	7.6		9.6			10.2	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--	9.6			10.2		
Approach LOS	--	--	A			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2008
Analysis Time Period	2008 No Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd	North/South Street: Northfork Rd / Rd 200
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	105	11	25	130	2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	2	0	5	17	0	20
Percent Heavy Vehicles	5	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	2	0	5	15	0	18
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	28	147	2	3	119	12
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	3	28		37			7	
C (m) (veh/h)	1414	1454		747			780	
v/c	0.00	0.02		0.05			0.01	
95% queue length	0.01	0.06		0.16			0.03	
Control Delay (s/veh)	7.6	7.5		10.1			9.7	
LOS	A	A		B			A	
Approach Delay (s/veh)	--	--	10.1			9.7		
Approach LOS	--	--	B			A		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 No Project PM

Site Information

Intersection	Northfork Rd @ Crane Valley Rd
Jurisdiction	Madera County
Analysis Year	2008

Project Description: 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	99	22			24	21
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	112	25	0	0	27	23
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				45		103
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	51	0	117
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	112						168	
C (m) (veh/h)	1570						881	
v/c	0.07						0.19	
95% queue length	0.23						0.70	
Control Delay (s/veh)	7.5						10.0	
LOS	A						B	
Approach Delay (s/veh)	–	–				10.0		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 44

OPENING DAY (2008) NO PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: SR 41 Critical Approach Speed 55 mph

MINOR STREET: THORNBERRY ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐ URBAN (U)

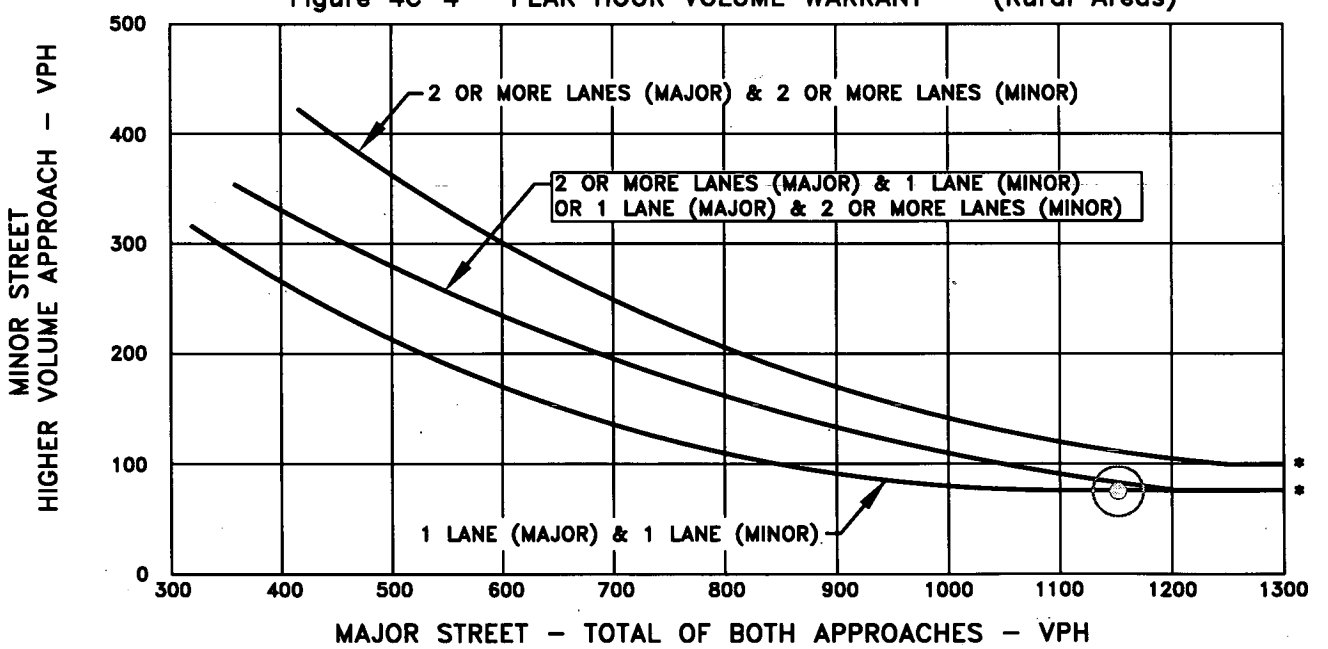
CONDITION: 2008 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street		✓	1152	1354				
Highest Approaches – Minor Street	✓		75	34				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: MALUM RIDGE ROAD Critical Approach Speed 55/25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

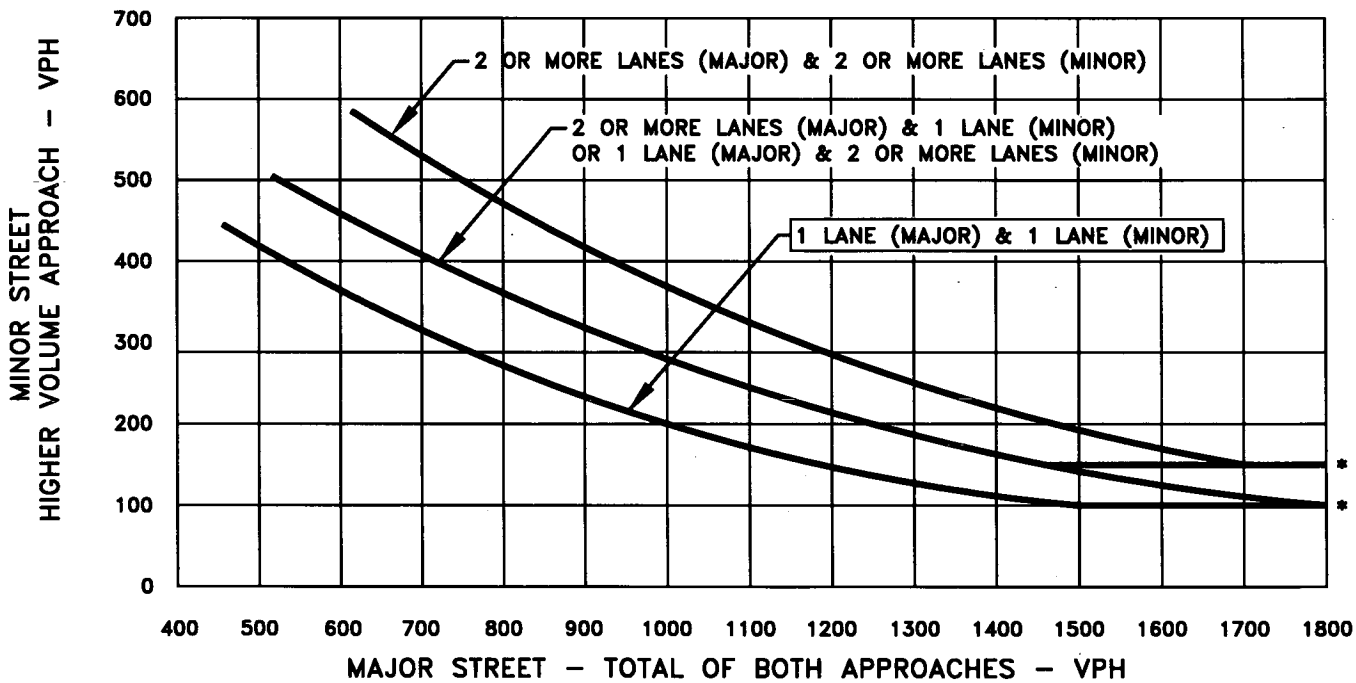
CONDITION: 2008 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		300	256			
Highest Approaches – Minor Street	✓		83	97			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

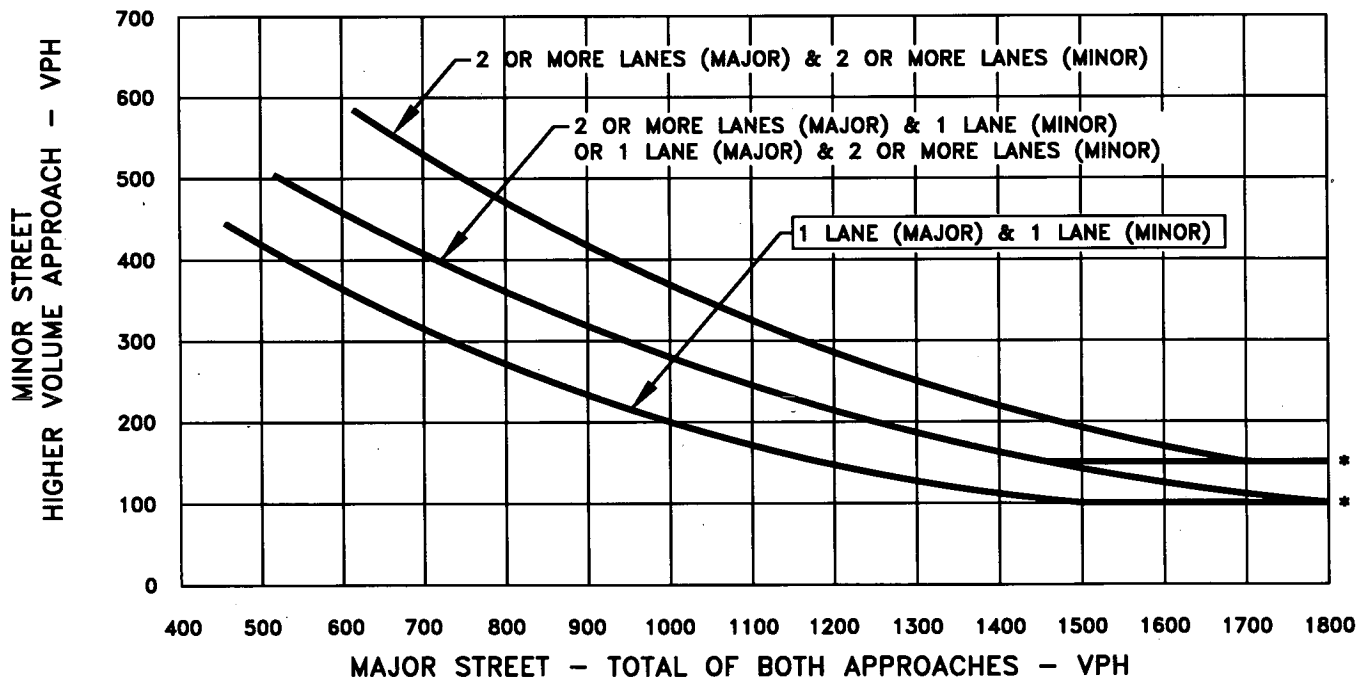
CONDITION: 2008 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		89	110			
Highest Approaches – Minor Street	✓		36	26			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

MINOR STREET: MISSION DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

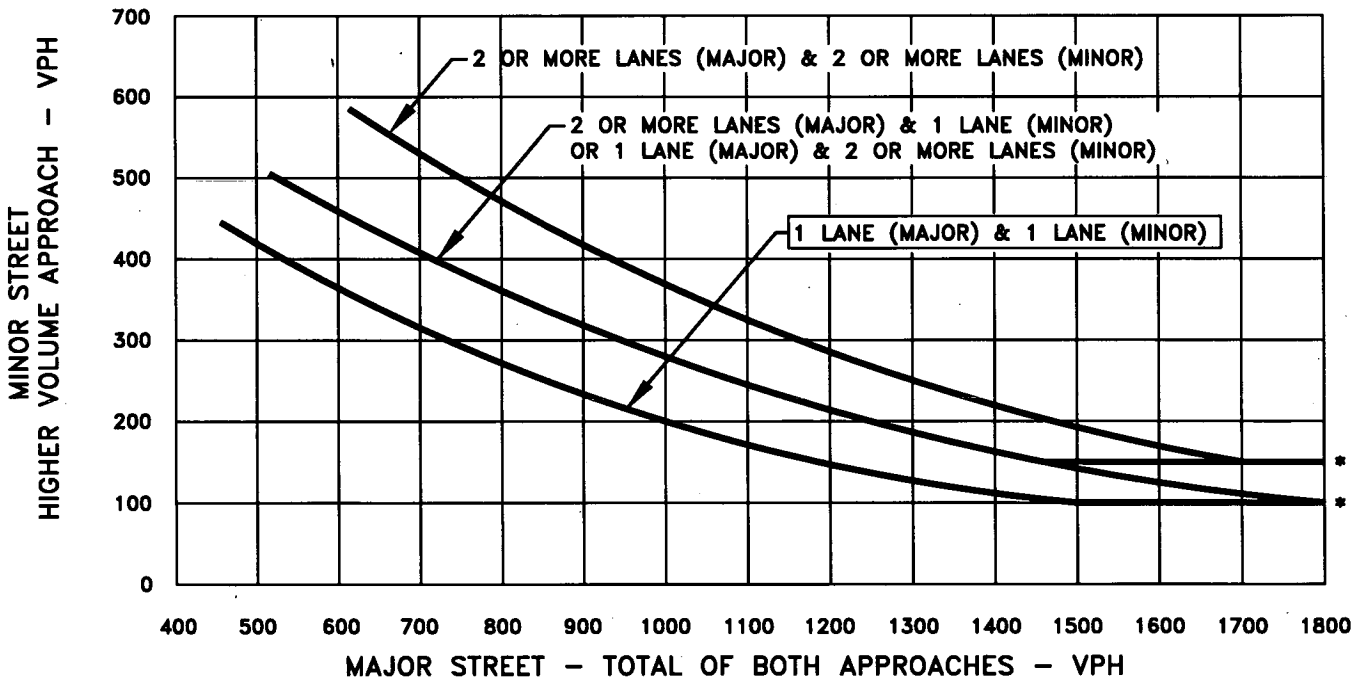
CONDITION: 2008 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		50	56			
Highest Approaches – Minor Street	✓		7	3			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: AUBERRY ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ]

[ ] URBAN (U)

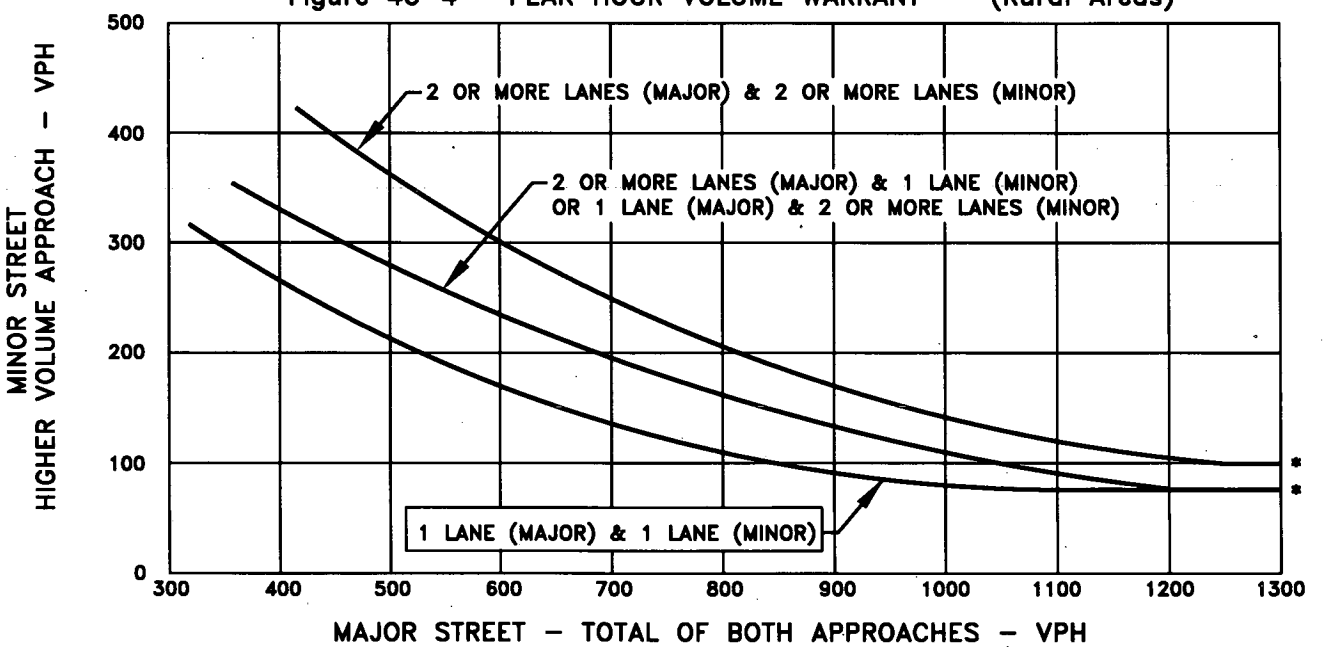
CONDITION: 2008 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		262	276				
Highest Approaches – Minor Street	✓		24	33				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: CRANE VALLEY ROAD Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- ☒ RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- ☐

☐ URBAN (U)

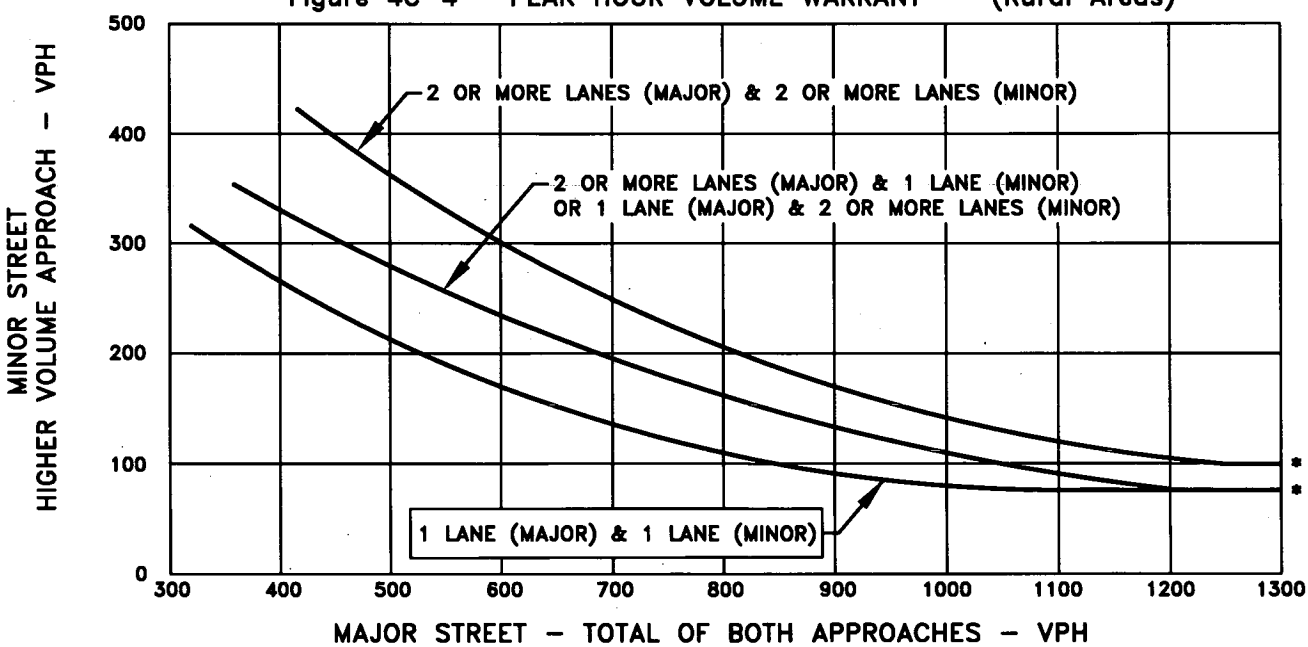
CONDITION: 2008 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		182	269				
Highest Approaches – Minor Street	✓		79	45				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

ATTACHMENT VI – C - 45

OPENING DAY (2008) PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948			0.963				0.850			0.850
Flt Protected		0.989			0.989		0.950			0.950		
Satd. Flow (prot)	0	1649	0	0	1630	0	1687	1776	1509	1770	1863	1583
Flt Permitted		0.894			0.887		0.950			0.950		
Satd. Flow (perm)	0	1491	0	0	1462	0	1687	1776	1509	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			22				23			141
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	44	72	73	29	70	37	35	243	20	44	785	124
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	11%	11%	11%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	50	82	83	33	80	42	40	276	23	50	892	141
Lane Group Flow (vph)	0	215	0	0	155	0	40	276	23	50	892	141
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	22.0	22.0	0.0	22.0	22.0	0.0	10.0	48.0	48.0	10.0	48.0	48.0
Total Split (%)	27.5%	27.5%	0.0%	27.5%	27.5%	0.0%	12.5%	60.0%	60.0%	12.5%	60.0%	60.0%
Maximum Green (s)	16.0	16.0		16.0	16.0		4.0	42.0	42.0	4.0	42.0	42.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		14.8			14.8		6.0	46.3	46.3	6.0	46.3	46.3
Actuated g/C Ratio		0.20			0.20		0.08	0.62	0.62	0.08	0.62	0.62
v/c Ratio		0.66			0.50		0.31	0.25	0.02	0.37	0.77	0.14
Control Delay		33.3			28.9		41.5	8.9	3.7	43.1	19.2	2.1
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		33.3			28.9		41.5	8.9	3.7	43.1	19.2	2.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			C		D	A	A	D	B	A
Approach Delay		33.3			28.9			12.4			18.1	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		79			57		19	65	0	24	341	0
Queue Length 95th (ft)		146			110		49	109	9	57	#594	22
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		374			356		129	1100	943	135	1154	1034
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.57			0.44		0.31	0.25	0.02	0.37	0.77	0.14

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74.8
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 19.8 Intersection LOS: B
Intersection Capacity Utilization 62.7% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41

ø1	ø2	ø4
10 s	48 s	22 s
ø5	ø6	ø8
10 s	48 s	22 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.943				0.850			0.850
Flt Protected		0.975			0.992		0.950			0.950		
Satd. Flow (prot)	0	1711	0	0	1546	0	1770	1863	1583	1770	1863	1583
Flt Permitted		0.688			0.921		0.950			0.950		
Satd. Flow (perm)	0	1207	0	0	1435	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			46				42			64
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	131	103	22	27	69	70	53	692	37	27	618	56
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	7%	15%	15%	15%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	149	117	25	31	78	80	60	786	42	31	702	64
Lane Group Flow (vph)	0	291	0	0	189	0	60	786	42	31	702	64
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	27.0	27.0	0.0	27.0	27.0	0.0	10.0	43.0	43.0	10.0	43.0	43.0
Total Split (%)	33.8%	33.8%	0.0%	33.8%	33.8%	0.0%	12.5%	53.8%	53.8%	12.5%	53.8%	53.8%
Maximum Green (s)	21.0	21.0		21.0	21.0		4.0	37.0	37.0	4.0	37.0	37.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		21.3			21.3		6.0	43.6	43.6	6.0	39.7	39.7
Actuated g/C Ratio		0.28			0.28		0.08	0.57	0.57	0.07	0.52	0.52
v/c Ratio		0.86			0.44		0.44	0.74	0.05	0.24	0.73	0.08
Control Delay		51.4			20.9		46.4	20.4	3.9	41.0	21.6	3.4
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		51.4			20.9		46.4	20.4	3.9	41.0	21.6	3.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D			C		D	C	A	D	C	A
Approach Delay		51.4			20.9			21.4			20.9	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)		133			56		29	237	0	15	274	0
Queue Length 95th (ft)		#260			111		65	#539	15	40	401	18
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		359			454		135	1056	916	129	963	850
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.81			0.42		0.44	0.74	0.05	0.24	0.73	0.08

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 76.8
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 25.2 Intersection LOS: C
Intersection Capacity Utilization 76.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41

ø1	ø2	ø4
10 s	43 s	27 s
ø5	ø6	ø8
10 s	43 s	27 s

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Northfork Road / Road 200	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		300	50	49	766	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	135	0	32
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				119		29
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	55	870	0	0	340	56
Percent Heavy Vehicles	0	0	0	7	0	7
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		55		167				
C (m) (veh/h)		1152		189				
v/c		0.05		0.88				
95% queue length		0.15		6.66				
Control Delay (s/veh)		8.3		88.7				
LOS		A		F				
Approach Delay (s/veh)	--	--	88.7					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Road / Road 200 | North/South Street: SR 41

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		818	98	33	475	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	51	0	52
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				45		46
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	37	539	0	0	929	111
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		37		103				
C (m) (veh/h)		665		176				
v/c		0.06		0.59				
95% queue length		0.18		3.15				
Control Delay (s/veh)		10.7		50.9				
LOS		B		F				
Approach Delay (s/veh)	--	--	50.9					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Thornberry Road / Road 420 | North/South Street: SR 41

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		667	9	29	447	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	46	0	38
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				41		34
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	32	507	0	0	757	10
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		32		84				
C (m) (veh/h)		836		293				
v/c		0.04		0.29				
95% queue length		0.12		1.15				
Control Delay (s/veh)		9.5		22.2				
LOS		A		C				
Approach Delay (s/veh)	--	--	22.2					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Thornberry Road / Road 420	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		647	15	35	657	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	13	0	25
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				12		22
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	39	746	0	0	735	17
Percent Heavy Vehicles	0	0	0	4	0	4
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		39		38				
C (m) (veh/h)		853		322				
v/c		0.05		0.12				
95% queue length		0.14		0.40				
Control Delay (s/veh)		9.4		17.7				
LOS		A		C				
Approach Delay (s/veh)	--	--	17.7					
Approach LOS	--	--	C					

Copyright © 2005 University of Florida, All Rights Reserved

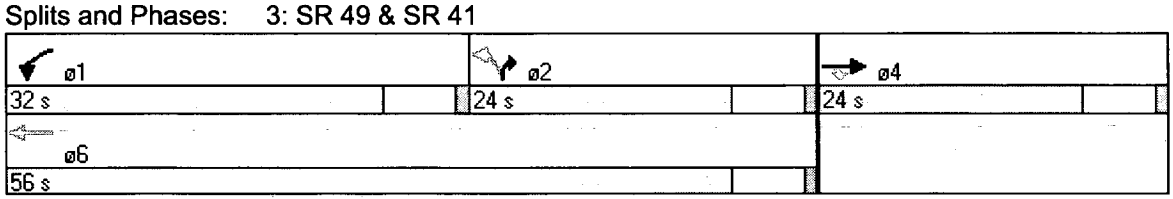
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1792	1524	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1792	1524	1719	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		548				674
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	105	552	434	371	132	593
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	6%	6%	5%	5%	5%	5%
Adj. Flow (vph)	119	627	493	422	150	674
Lane Group Flow (vph)	119	627	493	422	150	674
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases	4	4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	24.0	24.0	32.0	56.0	24.0	24.0
Total Split (%)	30.0%	30.0%	40.0%	70.0%	30.0%	30.0%
Maximum Green (s)	18.0	18.0	26.0	50.0	18.0	18.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	14.1	14.1	23.1	41.0	13.6	13.6
Actuated g/C Ratio	0.22	0.22	0.36	0.64	0.21	0.21
v/c Ratio	0.30	0.82	0.79	0.36	0.41	0.78
Control Delay	25.2	15.0	30.9	6.7	27.7	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	15.0	30.9	6.7	27.7	10.0
LOS	C	B	C	A	C	A
Approach Delay	16.7			19.7	13.2	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	B			B	B	
Queue Length 50th (ft)	42	27	167	64	55	0
Queue Length 95th (ft)	89	#150	#368	128	110	81
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	531	837	718	1270	506	928
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.75	0.69	0.33	0.30	0.73

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 63.6
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 16.6 Intersection LOS: B
Intersection Capacity Utilization 64.9% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



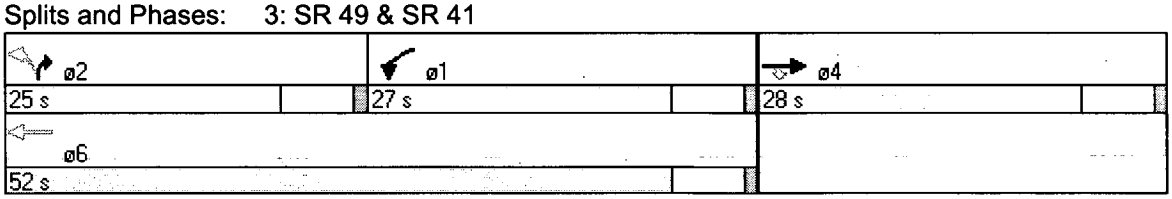
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		586				807
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	58	775	408	628	130	710
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	66	881	464	714	148	807
Lane Group Flow (vph)	66	881	464	714	148	807
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases		4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	28.0	28.0	27.0	52.0	25.0	25.0
Total Split (%)	35.0%	35.0%	33.8%	65.0%	31.3%	31.3%
Maximum Green (s)	22.0	22.0	21.0	46.0	19.0	19.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	24.2	24.2	22.2	41.4	15.1	15.1
Actuated g/C Ratio	0.33	0.33	0.30	0.56	0.21	0.21
v/c Ratio	0.11	0.96	0.87	0.68	0.41	0.83
Control Delay	20.0	33.5	44.4	15.1	28.6	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	33.5	44.4	15.1	28.6	11.2
LOS	B	C	D	B	C	B
Approach Delay	32.5			26.7	13.9	
Approach LOS	C			C	B	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	21	150	197	209	59	0
Queue Length 95th (ft)	51	#433	#384	307	106	87
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	611	913	549	1118	470	1013
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.96	0.85	0.64	0.31	0.80

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 73.6
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 24.5 Intersection LOS: C
Intersection Capacity Utilization 77.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	41	59	94	36	69	37
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	48	16	19	15	16	24
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	113	94	118	42	72	19	35	27
% Heavy Vehicles	2	0	3	3	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.4	0.0	0.3	0.0	0.8	0.0	0.5	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.7	0.2	-0.6	0.4	-0.7	0.3	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.10	0.08	0.10	0.04	0.06	0.02	0.03	0.02
hd, final value (s)	5.30	4.36	5.32	4.45	5.84	4.73	5.74	4.80
x, final value	0.17	0.11	0.17	0.05	0.12	0.02	0.06	0.04
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.0	2.1	3.0	2.1	3.5	2.4	3.4	2.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	363	344	368	292	322	269	285	277
Delay (s/veh)	9.05	7.62	9.14	7.39	9.31	7.55	8.78	7.68
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	8.40		8.68		8.94		8.30	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.57							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2008

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	36	117	48	8	76	36
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	4	6	40	6	64
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	172	48	95	40	61	6	51	72
% Heavy Vehicles	2	0	2	2	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.1	0.0	0.9	0.0	0.9	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.7	0.1	-0.7	0.5	-0.7	0.5	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.15	0.04	0.08	0.04	0.05	0.01	0.05	0.06
hd, final value (s)	5.29	4.44	5.30	4.55	6.00	4.80	5.92	4.78
x, final value	0.25	0.06	0.14	0.05	0.10	0.01	0.08	0.10
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.0	2.1	3.0	2.3	3.7	2.5	3.6	2.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	422	298	345	290	311	256	301	322
Delay (s/veh)	9.76	7.41	8.86	7.49	9.38	7.54	9.16	7.98
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	9.25		8.45		9.21		8.47	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.87							
Intersection LOS	A							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed		Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Cascadel Road	North/South Street: Mammoth Pool Rd / Rd 225
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		63	1	53	12	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	2	0	59
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				2		52
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	60	13	0	0	71	1
Percent Heavy Vehicles	0	0	0	3	0	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		60	2		59			
C (m) (veh/h)		1528	750		987			
v/c		0.04	0.00		0.06			
95% queue length		0.12	0.01		0.19			
Control Delay (s/veh)		7.5	9.8		8.9			
LOS		A	A		A			
Approach Delay (s/veh)	--	--	8.9					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description	04-837.1 Northfork Casino Alt D		
East/West Street:	Cascadel Road	North/South Street:	Mammoth Pool Rd / Rd 225
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		29	1	78	52	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	1	0	79
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				1		70
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	88	59	0	0	32	1
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		88	1		79			
C (m) (veh/h)		1572	669		1025			
v/c		0.06	0.00		0.08			
95% queue length		0.18	0.00		0.25			
Control Delay (s/veh)		7.4	10.4		8.8			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	8.8					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mission Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		51	8	2	48	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	57	9	2	54	0
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	7		6			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	7	0	6	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		2		13				
C (m) (veh/h)		1523		930				
v/c		0.00		0.01				
95% queue length		0.00		0.04				
Control Delay (s/veh)		7.4		8.9				
LOS		A		A				
Approach Delay (s/veh)	--	--	8.9					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mission Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		79	5	7	68	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	89	5	7	77	0
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3		7			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	3	0	7	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		7		10				
C (m) (veh/h)		1500		910				
v/c		0.00		0.01				
95% queue length		0.01		0.03				
Control Delay (s/veh)		7.4		9.0				
LOS		A		A				
Approach Delay (s/veh)	--	--	9.0					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd | North/South Street: Northfork Rd / Rd 200

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	145	13	15	95	4
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	1	1	1	6	1	20
Percent Heavy Vehicles	5	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	6	1	18
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	17	107	4	3	164	14
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	3	17		27			3	
C (m) (veh/h)	1460	1380		796			675	
v/c	0.00	0.01		0.03			0.00	
95% queue length	0.01	0.04		0.11			0.01	
Control Delay (s/veh)	7.5	7.6		9.7			10.4	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--	9.7			10.4		
Approach LOS	--	--	A			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2008
Analysis Time Period	2008 Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd	North/South Street: Northfork Rd / Rd 200
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	117	11	27	141	2
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	2	0	5	17	0	22
Percent Heavy Vehicles	5	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	2	0	5	15	0	20
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	30	160	2	3	132	12
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	3	30		39			7	
C (m) (veh/h)	1399	1438		730			757	
v/c	0.00	0.02		0.05			0.01	
95% queue length	0.01	0.06		0.17			0.03	
Control Delay (s/veh)	7.6	7.6		10.2			9.8	
LOS	A	A		B			A	
Approach Delay (s/veh)	--	--	10.2			9.8		
Approach LOS	--	--	B			A		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 Project AM

Site Information

Intersection	Northfork Rd @ Crane Valley Rd
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	76	21			23	58
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	86	23	0	0	26	65
Percent Heavy Vehicles	0	--	--	6	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				20		70
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	22	0	79
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	86						101	
C (m) (veh/h)	1517						921	
v/c	0.06						0.11	
95% queue length	0.18						0.37	
Control Delay (s/veh)	7.5						9.4	
LOS	A						A	
Approach Delay (s/veh)	--	--				9.4		
Approach LOS	--	--				A		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2008 Project PM

Site Information

Intersection	Northfork Rd @ Crane Valley Rd
Jurisdiction	Madera County
Analysis Year	2008

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	99	26			28	23
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	112	29	0	0	31	26
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				48		103
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	54	0	117
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	112						171	
C (m) (veh/h)	1560						867	
v/c	0.07						0.20	
95% queue length	0.23						0.73	
Control Delay (s/veh)	7.5						10.2	
LOS	A						B	
Approach Delay (s/veh)	–	–				10.2		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 46

OPENING DAY (2008) PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: MALUM RIDGE ROAD Critical Approach Speed 55/25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

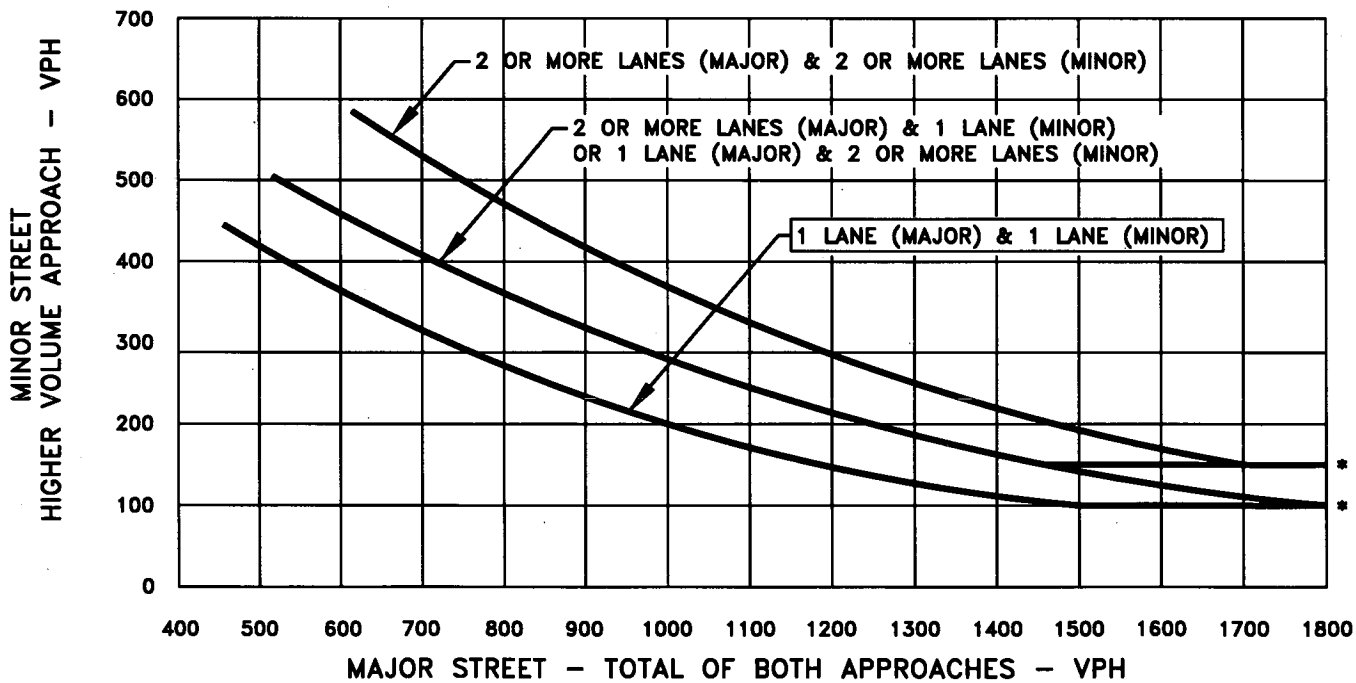
CONDITION: 2008 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		336	321			
Highest Approaches – Minor Street	✓		83	110			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

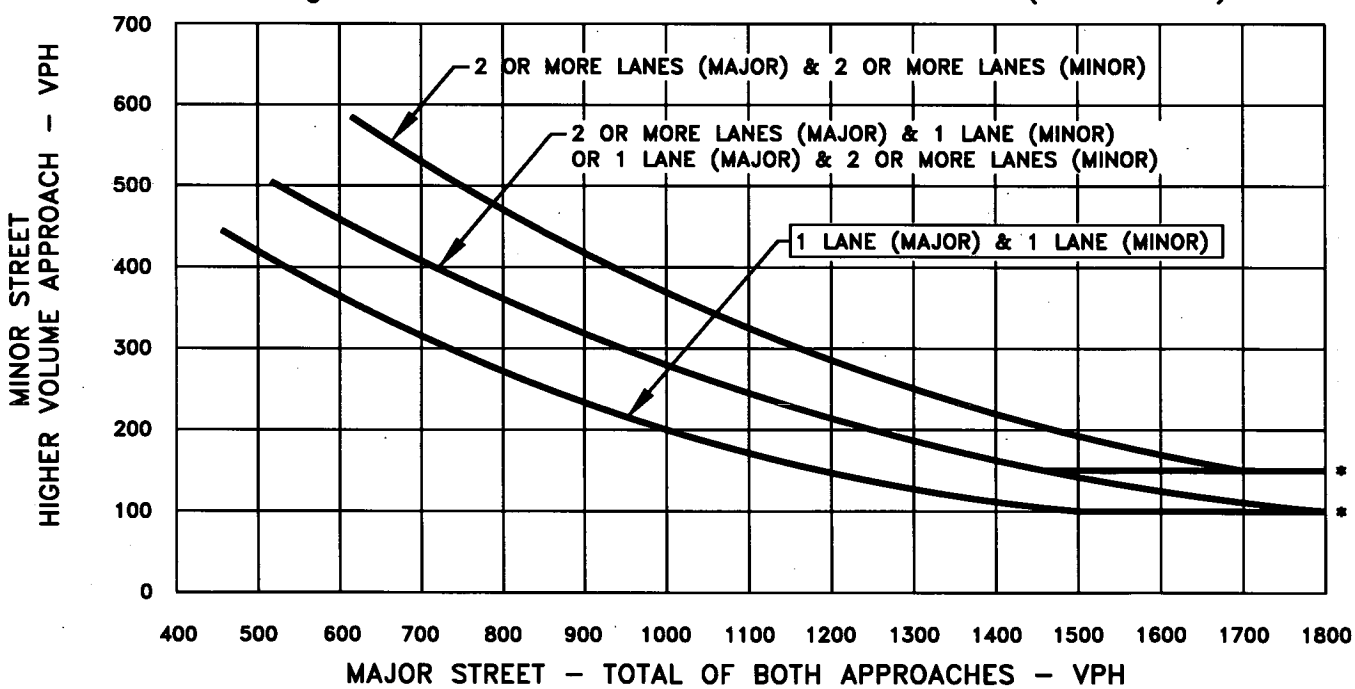
CONDITION: 2008 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		129	160			
Highest Approaches – Minor Street	✓		54	71			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

MINOR STREET: MISSION DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

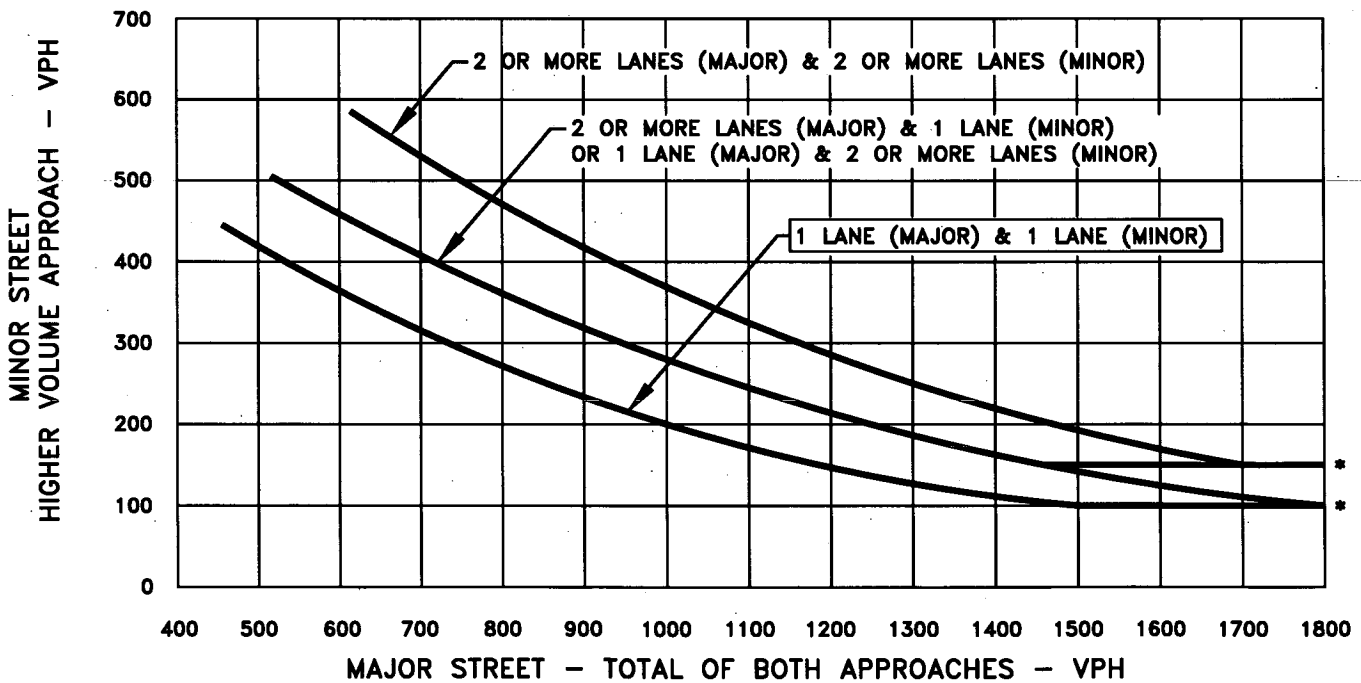
CONDITION: 2008 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		110	158			
Highest Approaches – Minor Street	✓		13	10			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: AUBERRY ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

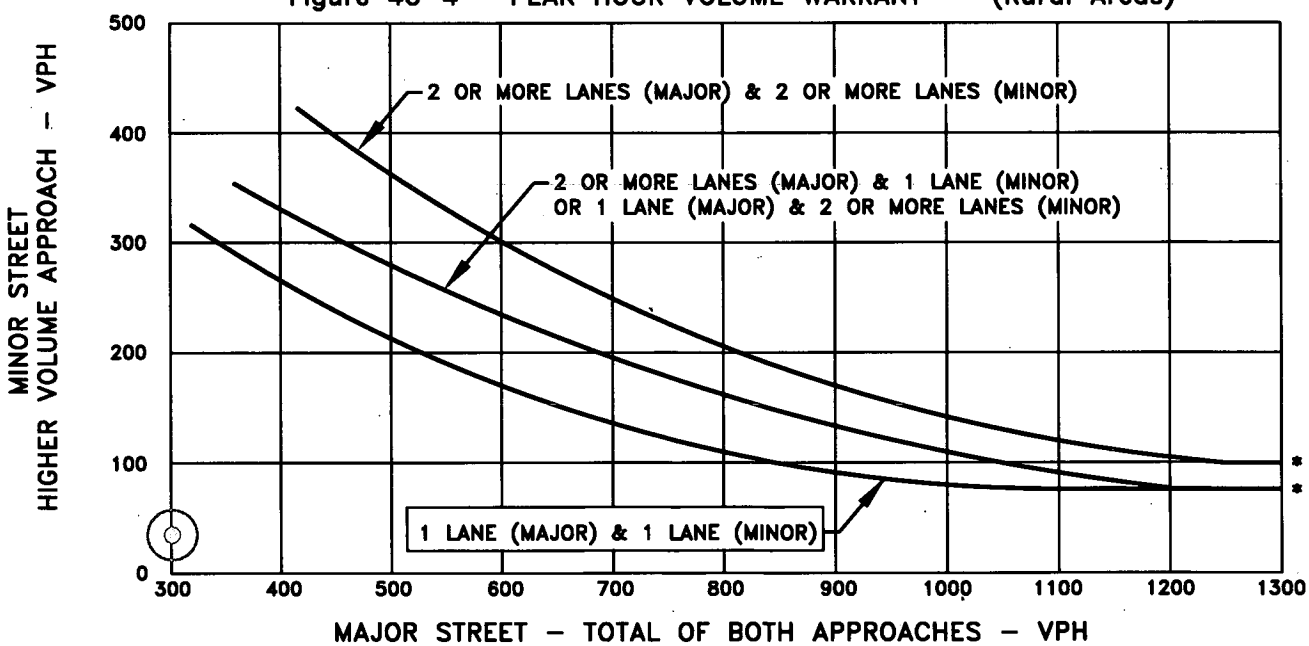
CONDITION: 2008 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		275	301				
Highest Approaches – Minor Street	✓		25	35				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: CRANE VALLEY ROAD Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

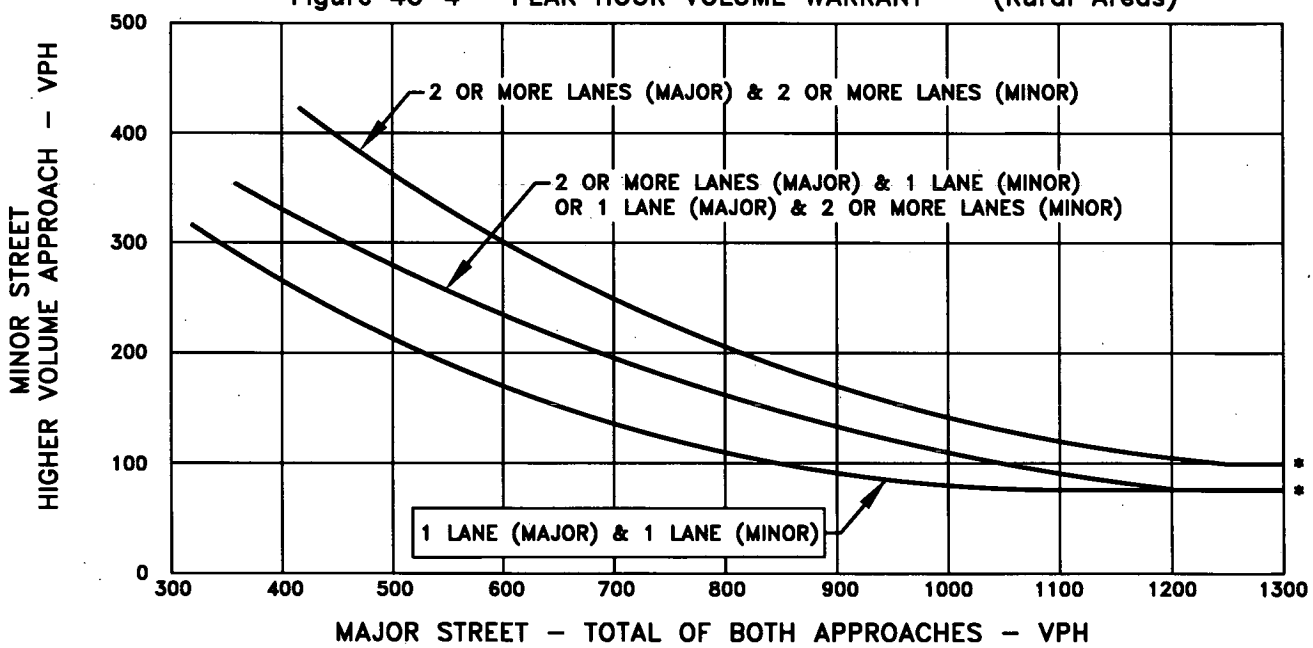
CONDITION: 2008 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		187	276				
Highest Approaches – Minor Street	✓		81	51				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

ATTACHMENT VI – C - 47

MITIGATED OPENING DAY (2008)

PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

INTERSECTION LEVEL OF SERVICE CALCULATIONS

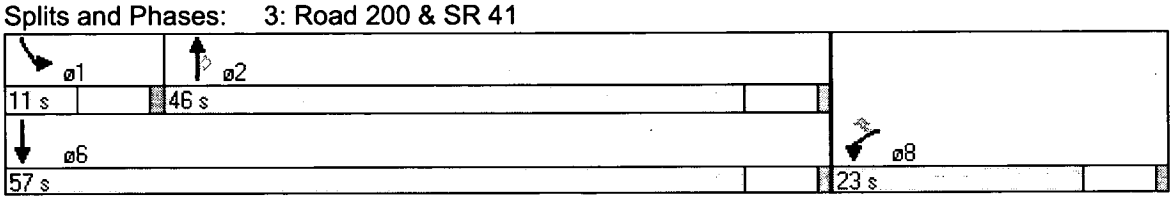
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	500	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1687	1509	1827	1553	1736	1827
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1687	1509	1827	1553	1736	1827
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		32		54		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	4332		3092			2876
Travel Time (s)	53.7		38.3			35.7
Volume (vph)	119	29	300	50	49	766
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	7%	4%	4%	4%	4%
Adj. Flow (vph)	129	32	326	54	53	833
Lane Group Flow (vph)	129	32	326	54	53	833
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	22.0
Total Split (s)	23.0	23.0	46.0	46.0	11.0	57.0
Total Split (%)	28.8%	28.8%	57.5%	57.5%	13.8%	71.3%
Maximum Green (s)	17.0	17.0	40.0	40.0	5.0	51.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	13.3	13.3	52.4	52.4	7.1	59.1
Actuated g/C Ratio	0.17	0.17	0.68	0.68	0.09	0.77
v/c Ratio	0.46	0.11	0.26	0.05	0.35	0.60
Control Delay	32.6	10.4	8.4	2.9	40.1	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.6	10.4	8.4	2.9	40.1	7.9
LOS	C	B	A	A	D	A
Approach Delay	28.2		7.6			9.9
Approach LOS	C		A			A

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	53	0	71	0	23	159
Queue Length 95th (ft)	102	21	136	15	59	330
Internal Link Dist (ft)	4252		3012			2796
Turn Bay Length (ft)					500	
Base Capacity (vph)	380	365	1239	1071	150	1398
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.09	0.26	0.05	0.35	0.60

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 77.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 11.3 Intersection LOS: B
Intersection Capacity Utilization 53.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Road 200 & SR 41



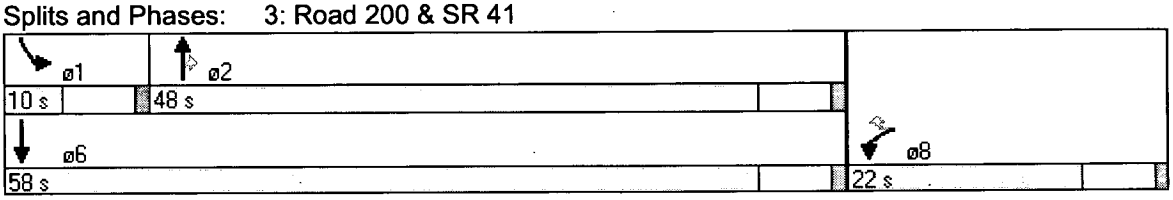
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	500	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1752	1845
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	1863	1583	1752	1845
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		50		107		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	4332		3092			2876
Travel Time (s)	53.7		38.3			35.7
Volume (vph)	45	46	818	98	33	475
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	49	50	889	107	36	516
Lane Group Flow (vph)	49	50	889	107	36	516
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	22.0
Total Split (s)	22.0	22.0	48.0	48.0	10.0	58.0
Total Split (%)	27.5%	27.5%	60.0%	60.0%	12.5%	72.5%
Maximum Green (s)	16.0	16.0	42.0	42.0	4.0	52.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	10.2	10.2	60.9	60.9	6.3	65.3
Actuated g/C Ratio	0.12	0.12	0.75	0.75	0.07	0.80
v/c Ratio	0.23	0.21	0.64	0.09	0.29	0.35
Control Delay	30.1	11.1	10.6	1.6	38.7	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	11.1	10.6	1.6	38.7	3.6
LOS	C	B	B	A	D	A
Approach Delay	20.5		9.6			5.9
Approach LOS	C		A			A

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	20	0	134	0	15	56
Queue Length 95th (ft)	48	28	454	17	43	109
Internal Link Dist (ft)	4252		3012			2796
Turn Bay Length (ft)					500	
Base Capacity (vph)	363	365	1389	1208	126	1477
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.14	0.64	0.09	0.29	0.35

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 81.6
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 9.0 Intersection LOS: A
Intersection Capacity Utilization 53.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Road 200 & SR 41



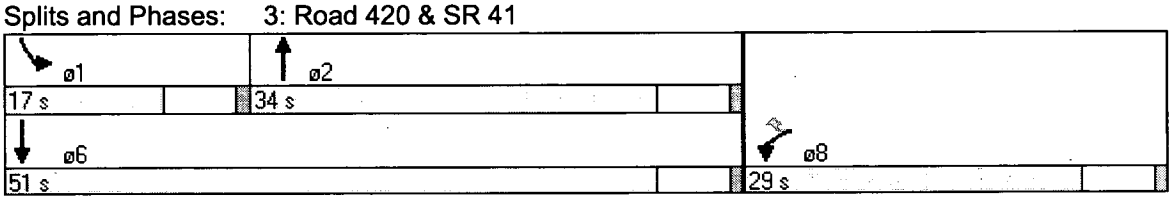
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.998			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3464	0	1752	3505
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	3464	0	1752	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		37	2			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	5640		3602			3534
Travel Time (s)	69.9		44.7			43.8
Volume (vph)	41	34	667	9	29	447
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Adj. Flow (vph)	45	37	725	10	32	486
Lane Group Flow (vph)	45	37	735	0	32	486
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	22.0	22.0	22.0		10.0	22.0
Total Split (s)	29.0	29.0	34.0	0.0	17.0	51.0
Total Split (%)	36.3%	36.3%	42.5%	0.0%	21.3%	63.8%
Maximum Green (s)	23.0	23.0	28.0		11.0	45.0
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	Max		None	Max
Act Effct Green (s)	10.1	10.1	58.3		9.6	64.9
Actuated g/C Ratio	0.12	0.12	0.75		0.11	0.83
v/c Ratio	0.21	0.16	0.28		0.16	0.17
Control Delay	26.4	10.8	6.2		27.4	2.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	26.4	10.8	6.2		27.4	2.3
LOS	C	B	A		C	A
Approach Delay	19.4		6.2			3.8
Approach LOS	B		A			A
Queue Length 50th (ft)	16	0	37		11	22
Queue Length 95th (ft)	41	22	134		33	41

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Internal Link Dist (ft)	5560		3522			3454
Turn Bay Length (ft)						
Base Capacity (vph)	477	453	2593		272	2921
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.09	0.08	0.28		0.12	0.17

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 77.9
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.28
Intersection Signal Delay: 6.1 Intersection LOS: A
Intersection Capacity Utilization 34.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Road 420 & SR 41



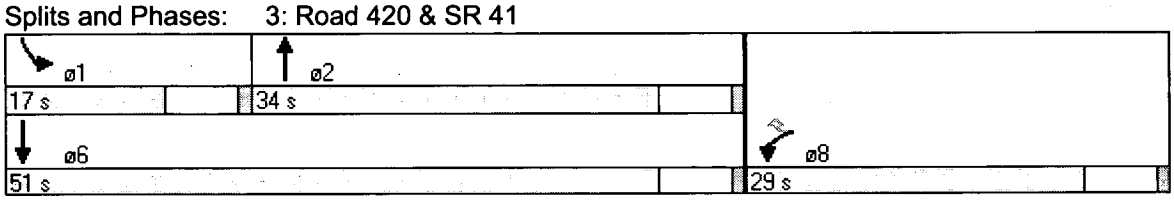
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.997			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1736	1553	3529	0	1770	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1736	1553	3529	0	1770	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		24	3			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	5640		3602			3534
Travel Time (s)	69.9		44.7			43.8
Volume (vph)	12	22	647	15	35	657
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	2%	2%	2%	2%
Adj. Flow (vph)	13	24	703	16	38	714
Lane Group Flow (vph)	13	24	719	0	38	714
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	22.0	22.0	22.0		10.0	22.0
Total Split (s)	29.0	29.0	34.0	0.0	17.0	51.0
Total Split (%)	36.3%	36.3%	42.5%	0.0%	21.3%	63.8%
Maximum Green (s)	23.0	23.0	28.0		11.0	45.0
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	Max		None	Max
Act Effct Green (s)	9.3	9.3	66.4		10.3	73.7
Actuated g/C Ratio	0.10	0.10	0.81		0.11	0.89
v/c Ratio	0.07	0.13	0.25		0.19	0.23
Control Delay	25.0	12.3	5.2		25.8	1.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	25.0	12.3	5.2		25.8	1.6
LOS	C	B	A		C	A
Approach Delay	16.7		5.2			2.9
Approach LOS	B		A			A
Queue Length 50th (ft)	3	0	0		10	0
Queue Length 95th (ft)	18	18	122		36	53

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Internal Link Dist (ft)	5560		3522			3454
Turn Bay Length (ft)						
Base Capacity (vph)	445	416	2843		274	3166
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.03	0.06	0.25		0.14	0.23

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 82.4
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.25
Intersection Signal Delay: 4.3 Intersection LOS: A
Intersection Capacity Utilization 35.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Road 420 & SR 41



ATTACHMENT VI – C - 48

2030 NO PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.964			0.954				0.850			0.850
Flt Protected		0.989			0.990		0.950			0.950		
Satd. Flow (prot)	0	1677	0	0	1617	0	1687	1776	1509	1770	1863	1583
Flt Permitted		0.674			0.720		0.950			0.950		
Satd. Flow (perm)	0	1143	0	0	1176	0	1687	1776	1509	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			22				77			197
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	80	190	98	75	175	130	59	565	68	123	1104	173
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	11%	11%	11%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	91	216	111	85	199	148	67	642	77	140	1255	197
Lane Group Flow (vph)	0	418	0	0	432	0	67	642	77	140	1255	197
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	39.0	39.0	0.0	39.0	39.0	0.0	10.0	64.0	64.0	17.0	71.0	71.0
Total Split (%)	32.5%	32.5%	0.0%	32.5%	32.5%	0.0%	8.3%	53.3%	53.3%	14.2%	59.2%	59.2%
Maximum Green (s)	33.0	33.0		33.0	33.0		4.0	58.0	58.0	11.0	65.0	65.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		35.0			35.0		6.0	60.3	60.3	12.7	67.0	67.0
Actuated g/C Ratio		0.29			0.29		0.05	0.50	0.50	0.11	0.56	0.56
v/c Ratio		1.22			1.20		0.80	0.72	0.10	0.74	1.21	0.20
Control Delay		156.9			151.2		110.3	29.1	3.8	75.8	128.9	2.2
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		156.9			151.2		110.3	29.1	3.8	75.8	128.9	2.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			F		F	C	A	E	F	A
Approach Delay		156.9			151.2			33.5			108.6	
Approach LOS		F			F			C			F	
Queue Length 50th (ft)		~390			~396		52	377	0	107	~1185	0
Queue Length 95th (ft)		#573			#582		#132	506	23	#195	#1394	30
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		344			359		84	892	796	192	1040	971
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		1.22			1.20		0.80	0.72	0.10	0.73	1.21	0.20

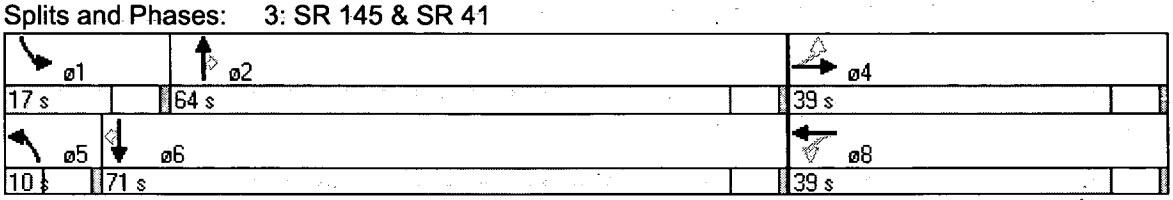
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 102.3 Intersection LOS: F
Intersection Capacity Utilization 99.7% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.944				0.850			0.850
Flt Protected		0.981			0.993		0.950			0.950		
Satd. Flow (prot)	0	1728	0	0	1549	0	1770	1863	1583	1770	1863	1583
Flt Permitted		0.543			0.853		0.950			0.950		
Satd. Flow (perm)	0	956	0	0	1330	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			35				100			108
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	172	236	27	62	176	171	81	998	93	81	967	98
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	7%	15%	15%	15%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	195	268	31	70	200	194	92	1134	106	92	1099	111
Lane Group Flow (vph)	0	494	0	0	464	0	92	1134	106	92	1099	111
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	50.0	50.0	0.0	50.0	50.0	0.0	10.0	60.0	60.0	10.0	60.0	60.0
Total Split (%)	41.7%	41.7%	0.0%	41.7%	41.7%	0.0%	8.3%	50.0%	50.0%	8.3%	50.0%	50.0%
Maximum Green (s)	44.0	44.0		44.0	44.0		4.0	54.0	54.0	4.0	54.0	54.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		46.0			46.0		6.0	56.0	56.0	6.0	56.0	56.0
Actuated g/C Ratio		0.38			0.38		0.05	0.47	0.47	0.05	0.47	0.47
v/c Ratio		1.34			0.87		1.03	1.30	0.13	1.03	1.26	0.14
Control Delay		203.1			50.5		160.5	175.1	4.4	160.5	158.2	4.0
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		203.1			50.5		160.5	175.1	4.4	160.5	158.2	4.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			D		F	F	A	F	F	A
Approach Delay		203.1			50.5			160.5			145.2	
Approach LOS		F			D			F			F	
Queue Length 50th (ft)		~501			309		~77	~1127	2	~77	~1071	1
Queue Length 95th (ft)		#693			#488		#182	#1338	32	#182	#1282	31
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		368			531		89	869	792	89	869	796
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		1.34			0.87		1.03	1.30	0.13	1.03	1.26	0.14

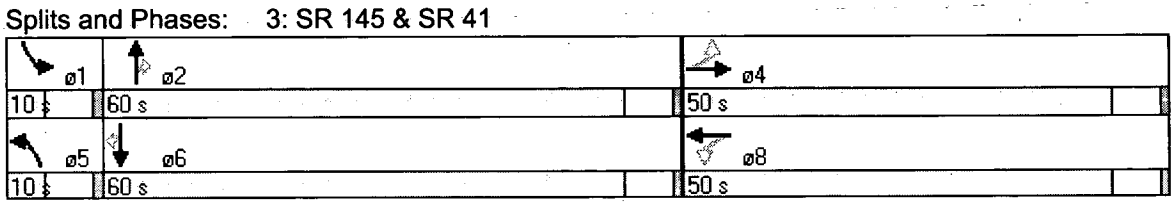
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.34
Intersection Signal Delay: 146.6 Intersection LOS: F
Intersection Capacity Utilization 117.1% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Road / Road 200	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		683	117	99	1132	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	135	0	71
Percent Heavy Vehicles	0	–	–	4	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				119		63
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	112	1286	0	0	776	132
Percent Heavy Vehicles	0	0	0	7	0	7
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		112		206				
C (m) (veh/h)		741		52				
v/c		0.15		3.96				
95% queue length		0.53		22.66				
Control Delay (s/veh)		10.7		1494				
LOS		B		F				
Approach Delay (s/veh)	–	–	1494					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 10/4/2006 5:59 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Rd 200 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Road / Road 200 | North/South Street: SR 41

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1183	180	67	859	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	119	0	111
Percent Heavy Vehicles	0	–	–	3	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				105		98
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	76	976	0	0	1344	204
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		76		230				
C (m) (veh/h)		425		46				
v/c		0.18		5.00				
95% queue length		0.64		26.28				
Control Delay (s/veh)		15.3		1976				
LOS		C		F				
Approach Delay (s/veh)	–	–	1976					
Approach LOS	–	–	F					

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2 Generated: 10/4/2006 6:00 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Thornberry Road / Road 420	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1087	20	69	0	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	77	0	64
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				68		57
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	78	0	0	0	1235	22
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		78		141				
C (m) (veh/h)		544		168				
v/c		0.14		0.84				
95% queue length		0.50		5.78				
Control Delay (s/veh)		12.7		87.2				
LOS		B		F				
Approach Delay (s/veh)	--	--	87.2					
Approach LOS	--	--	F					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Road 420 @ SR 41
Agency/Co.	TPG Consulting	Jurisdiction	Caltrans
Date Performed	8/25/2005	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Thornberry Road / Road 420	North/South Street: SR 41
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1055	31	70	0	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	32	0	63
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				29		56
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	79	0	0	0	1198	35
Percent Heavy Vehicles	0	0	0	4	0	4
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		79		95				
C (m) (veh/h)		561		223				
v/c		0.14		0.43				
95% queue length		0.49		1.98				
Control Delay (s/veh)		12.5		32.6				
LOS		B		D				
Approach Delay (s/veh)	--	--	32.6					
Approach LOS	--	--	D					

Copyright © 2005 University of Florida, All Rights Reserved

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1792	1524	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1792	1524	1719	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		508				853
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	142	757	691	541	203	983
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	6%	6%	5%	5%	5%	5%
Adj. Flow (vph)	161	860	785	615	231	1117
Lane Group Flow (vph)	161	860	785	615	231	1117
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases	4	4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	31.0	31.0	50.0	89.0	39.0	39.0
Total Split (%)	25.8%	25.8%	41.7%	74.2%	32.5%	32.5%
Maximum Green (s)	25.0	25.0	44.0	83.0	33.0	33.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	27.0	27.0	46.0	85.0	35.0	35.0
Actuated g/C Ratio	0.22	0.22	0.38	0.71	0.29	0.29
v/c Ratio	0.40	1.17	1.19	0.48	0.46	1.06
Control Delay	43.1	107.5	134.8	9.2	38.4	56.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	107.5	134.8	9.2	38.4	56.2
LOS	D	F	F	A	D	E
Approach Delay	97.4			79.6	53.2	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	F			E	D	
Queue Length 50th (ft)	107	~468	~734	188	146	~450
Queue Length 95th (ft)	169	#679	#941	251	219	#665
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	403	737	659	1282	501	1053
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	1.17	1.19	0.48	0.46	1.06

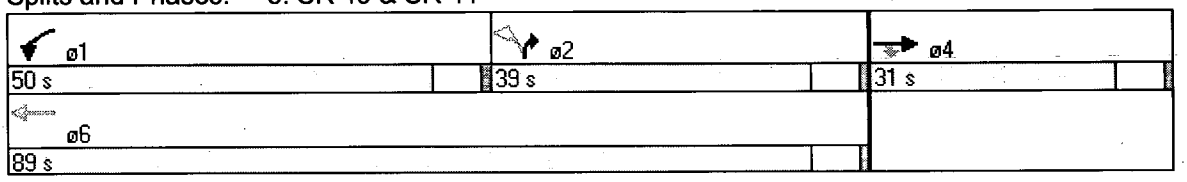
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 75.0 Intersection LOS: E
Intersection Capacity Utilization 91.8% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		472				792
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	208	865	779	678	321	986
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	236	983	885	770	365	1120
Lane Group Flow (vph)	236	983	885	770	365	1120
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases		4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	34.0	34.0	50.0	86.0	36.0	36.0
Total Split (%)	28.3%	28.3%	41.7%	71.7%	30.0%	30.0%
Maximum Green (s)	28.0	28.0	44.0	80.0	30.0	30.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	30.0	30.0	46.0	82.0	32.0	32.0
Actuated g/C Ratio	0.25	0.25	0.38	0.68	0.27	0.27
v/c Ratio	0.51	1.31	1.30	0.60	0.77	1.12
Control Delay	43.2	169.8	179.6	12.8	53.1	79.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.2	169.8	179.6	12.8	53.1	79.4
LOS	D	F	F	B	D	E
Approach Delay	145.3			102.0	72.9	
Approach LOS	F			F	E	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	158	~692	~880	292	262	~516
Queue Length 95th (ft)	233	#905	#1089	386	#369	#731
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	466	750	679	1273	472	1003
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	1.31	1.30	0.60	0.77	1.12

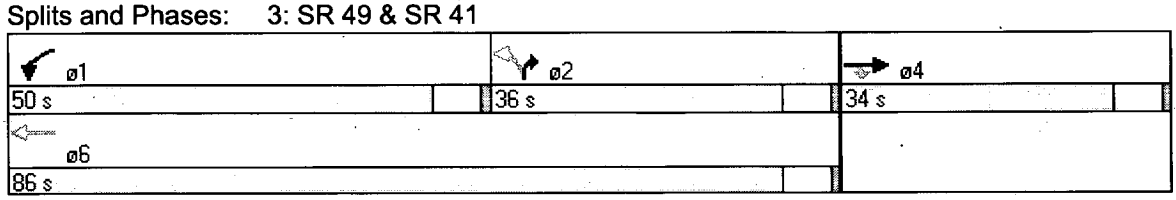
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.31
Intersection Signal Delay: 104.2 Intersection LOS: F
Intersection Capacity Utilization 103.4% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	S. Leon	Intersection	Road 225 @ Road 274
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/2/06	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225 | North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	57	79	159	69	100	52
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	85	26	49	13	38	50
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	153	159	191	59	125	49	57	56
% Heavy Vehicles	2	0	3	3	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.4	0.0	0.4	0.0	0.8	0.0	0.2	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.7	0.3	-0.6	0.4	-0.7	0.2	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.14	0.14	0.17	0.05	0.11	0.04	0.05	0.05
hd, final value (s)	5.87	4.93	5.94	5.03	6.47	5.35	6.31	5.49
x, final value	0.25	0.22	0.31	0.08	0.22	0.07	0.10	0.09
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.6	2.6	3.6	2.7	4.2	3.0	4.0	3.2

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	403	409	441	309	375	299	307	306
Delay (s/veh)	10.51	8.99	11.34	8.18	11.03	8.47	9.71	8.70
LOS	B	A	B	A	B	A	A	A
Approach: Delay (s/veh)	9.74		10.60		10.31		9.21	
LOS	A		B		B		A	
Intersection Delay (s/veh)	10.04							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	S. Leon	Intersection	Road 225 @ Road 274
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/2/06	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225 | North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	57	153	88	22	100	53
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	95	9	15	48	12	94
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	237	88	138	60	117	15	67	106
% Heavy Vehicles	2	0	2	2	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3	0.0	0.2	0.0	0.9	0.0	0.8	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.7	0.1	-0.7	0.5	-0.7	0.4	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.21	0.08	0.12	0.05	0.10	0.01	0.06	0.09
hd, final value (s)	5.79	4.92	5.89	5.10	6.56	5.37	6.47	5.37
x, final value	0.38	0.12	0.23	0.08	0.21	0.02	0.12	0.16
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.5	2.6	3.6	2.8	4.3	3.1	4.2	3.1

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	487	338	388	310	367	265	317	356
Delay (s/veh)	12.00	8.29	10.30	8.27	11.03	8.19	10.05	9.07
LOS	B	A	B	A	B	A	B	A
Approach: Delay (s/veh)	11.00		9.69		10.71		9.45	
LOS	B		A		B		A	
Intersection Delay (s/veh)	10.31							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road | North/South Street: Mammoth Pool Rd / Rd 225

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		103	6	24	0	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	57
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				19		51
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	27	0	0	0	117	6
Percent Heavy Vehicles	0	0	0	3	0	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		27	21		57			
C (m) (veh/h)		1464	799		929			
v/c		0.02	0.03		0.06			
95% queue length		0.06	0.08		0.20			
Control Delay (s/veh)		7.5	9.6		9.1			
LOS		A	A		A			
Approach Delay (s/veh)	--	--	9.3					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road | North/South Street: Mammoth Pool Rd / Rd 225

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		60	16	40	85	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	14	0	42
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				13		37
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	45	96	0	0	68	18
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		45	14		42			
C (m) (veh/h)		1504	692		967			
v/c		0.03	0.02		0.04			
95% queue length		0.09	0.06		0.14			
Control Delay (s/veh)		7.5	10.3		8.9			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.2					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mission Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		22	15	0	58	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	25	17	0	65	0
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0		0			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		0		0				
C (m) (veh/h)		1554						
v/c		0.00						
95% queue length		0.00						
Control Delay (s/veh)		7.3						
LOS		A						
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mission Drive
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		56	9	0	43	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	63	10	0	48	0
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0		0			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		0		0				
C (m) (veh/h)		1527						
v/c		0.00						
95% queue length		0.00						
Control Delay (s/veh)		7.4						
LOS		A						
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd | North/South Street: Northfork Rd / Rd 200

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	7	194	29	23	157	7
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	1	1	1	18	2	30
Percent Heavy Vehicles	5	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	16	2	27
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	26	178	7	7	220	32
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	7	26		50			3	
C (m) (veh/h)	1372	1296		648			542	
v/c	0.01	0.02		0.08			0.01	
95% queue length	0.02	0.06		0.25			0.02	
Control Delay (s/veh)	7.6	7.8		11.0			11.7	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	11.0			11.7		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	J. Gormley	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/26/2005	Analysis Year	2030
Analysis Time Period	2030 No Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd | North/South Street: Northfork Rd / Rd 200

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	6	166	26	43	186	0
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	4	2	11	37	2	35
Percent Heavy Vehicles	5	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	2	10	33	2	31
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	48	211	0	6	188	29
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	6	48		74			17	
C (m) (veh/h)	1342	1353		576			620	
v/c	0.00	0.04		0.13			0.03	
95% queue length	0.01	0.11		0.44			0.08	
Control Delay (s/veh)	7.7	7.8		12.2			11.0	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	12.2			11.0		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Northfork Rd @ Crane Valley Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/2/06	Analysis Year	2030
Analysis Time Period	2030 No Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	96	54			50	87
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	109	61	0	0	56	98
Percent Heavy Vehicles	0	--	--	6	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				39		98
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	44	0	111
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	109						155	
C (m) (veh/h)	1439						802	
v/c	0.08						0.19	
95% queue length	0.25						0.71	
Control Delay (s/veh)	7.7						10.6	
LOS	A						B	
Approach Delay (s/veh)	--	--				10.6		
Approach LOS	--	--				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2030 No Project PM

Site Information

Intersection	Northfork Rd @ Crane Valley Rd
Jurisdiction	Madera County
Analysis Year	2030

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	126	49			59	44
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	143	55	0	0	67	50
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				75		124
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	85	0	140
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	143						225	
C (m) (veh/h)	1484						734	
v/c	0.10						0.31	
95% queue length	0.32						1.30	
Control Delay (s/veh)	7.7						12.1	
LOS	A						B	
Approach Delay (s/veh)	–	–				12.1		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 49

2030 NO PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: MALUM RIDGE ROAD Critical Approach Speed 55/25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

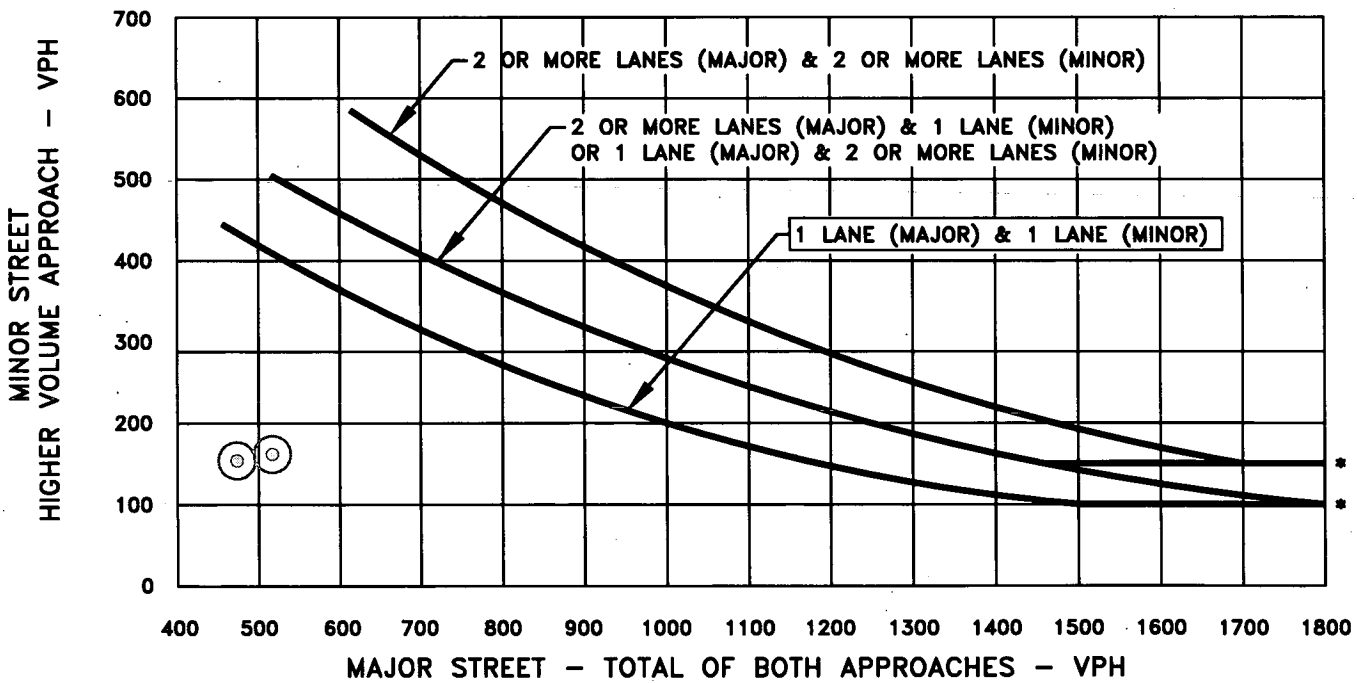
CONDITION: 2030 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		516	473			
Highest Approaches – Minor Street	✓		160	154			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

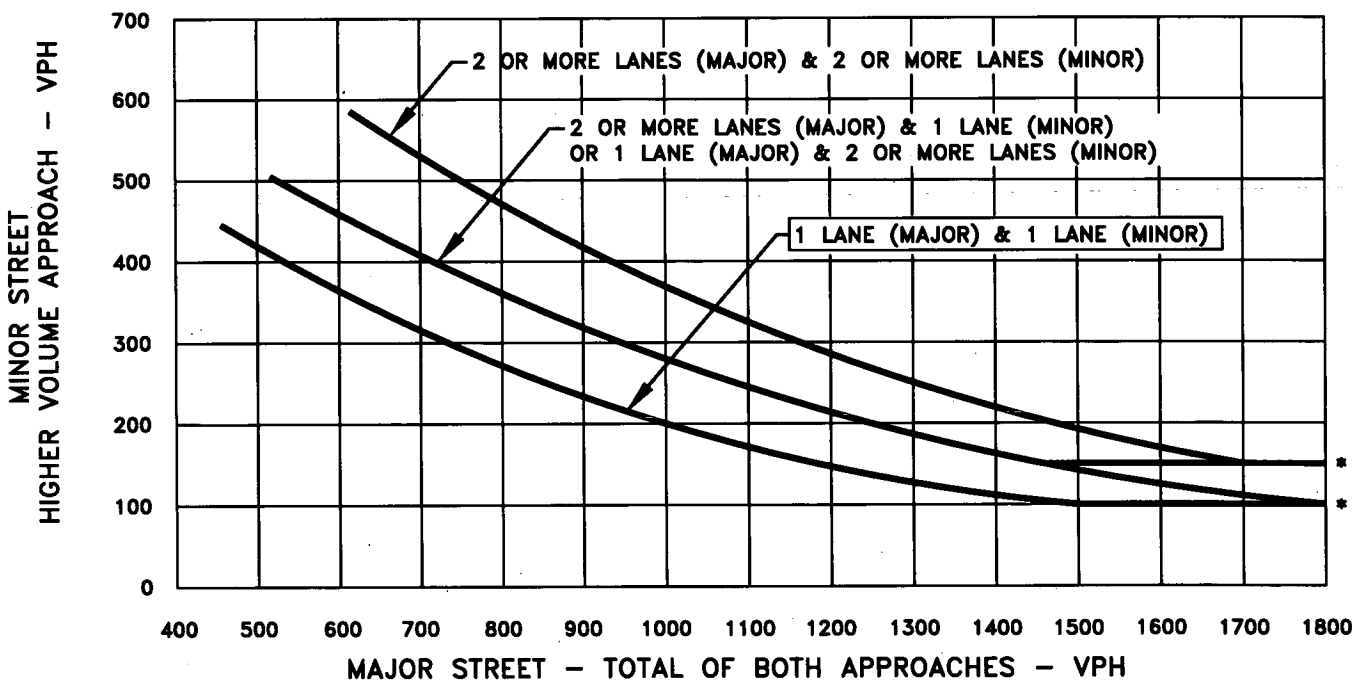
CONDITION: 2030 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		179	201			
Highest Approaches – Minor Street	✓		70	50			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

MINOR STREET: MISSION DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

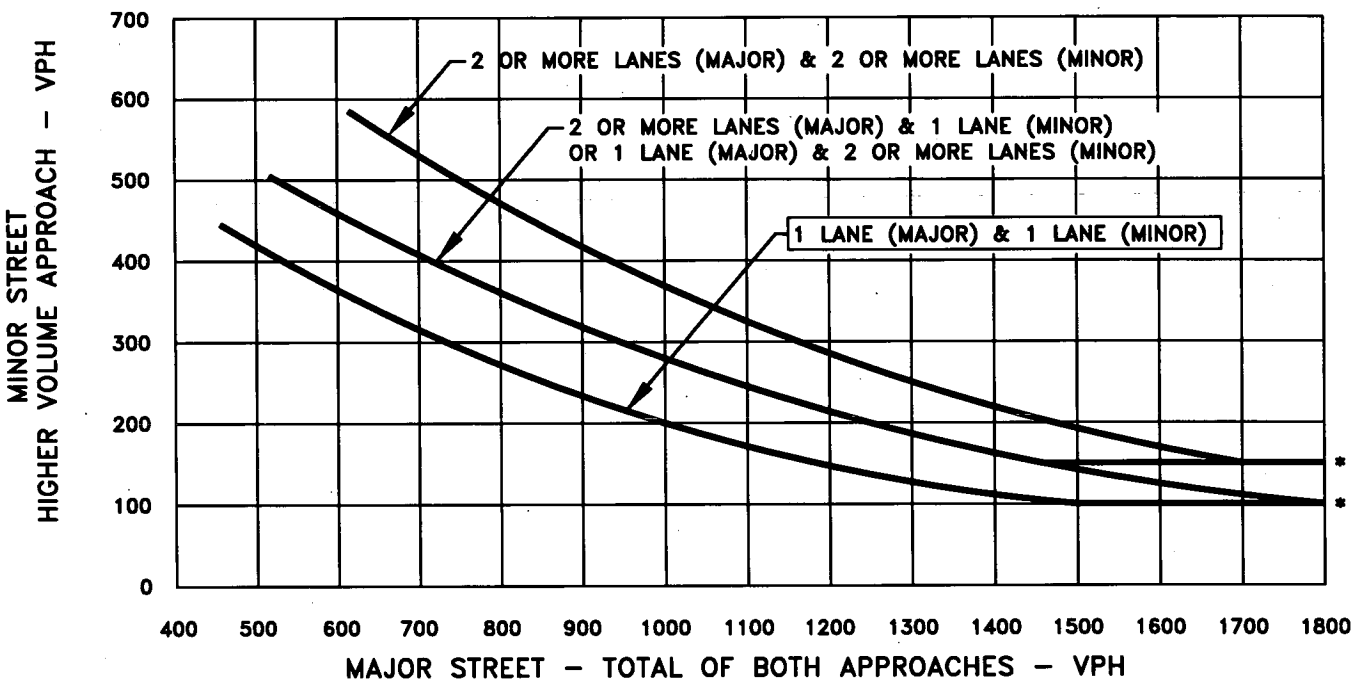
CONDITION: 2030 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		95	108			
Highest Approaches – Minor Street	✓		12	6			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: AUBERRY ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

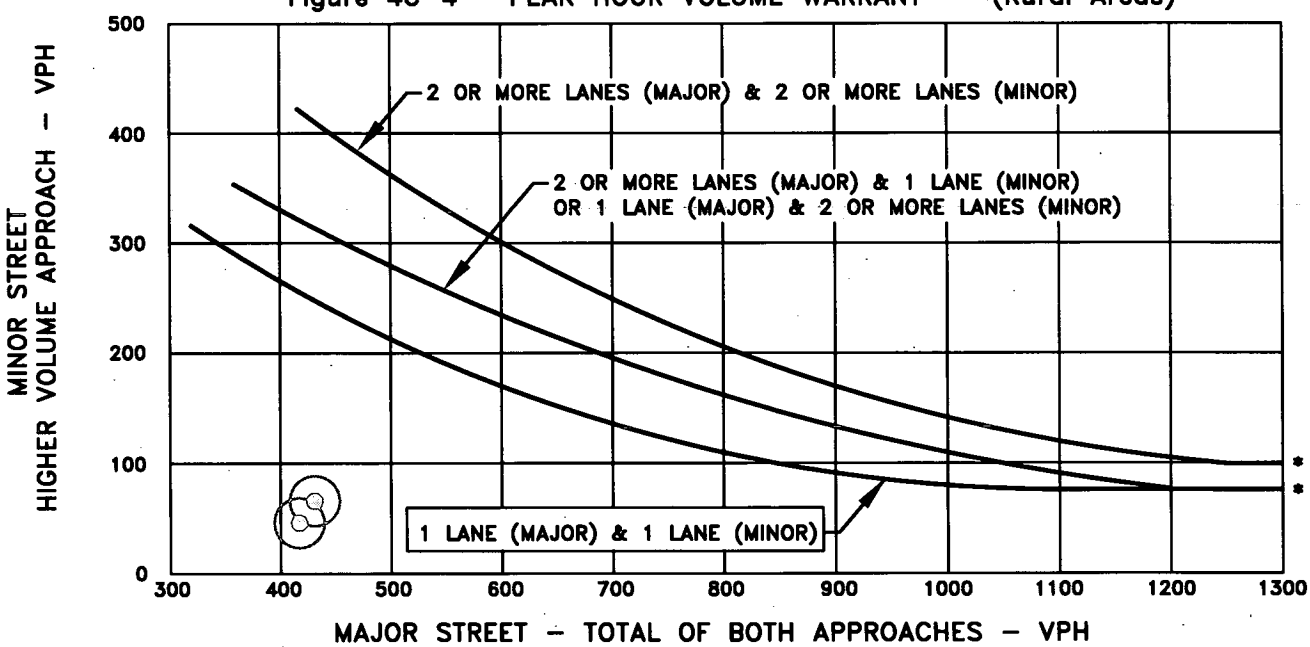
CONDITION: 2030 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		417	431				
Highest Approaches – Minor Street	✓		45	66				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC JQ DATE 09/23/05 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: CRANE VALLEY ROAD Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

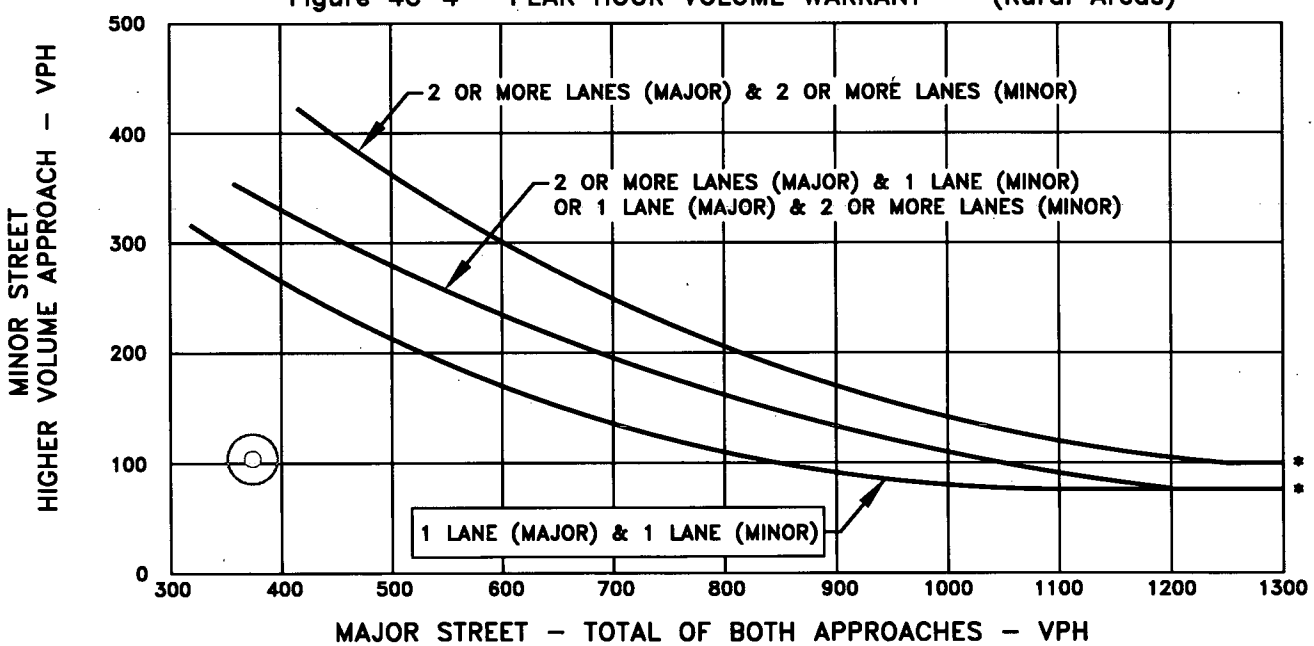
CONDITION: 2030 NO/"0" PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		287	374				
Highest Approaches – Minor Street	✓		137	103				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

ATTACHMENT VI – C - 50

2030 PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.964			0.954				0.850			0.850
Flt Protected		0.989			0.990		0.950			0.950		
Satd. Flow (prot)	0	1677	0	0	1617	0	1687	1776	1509	1770	1863	1583
Flt Permitted		0.681			0.728		0.950			0.950		
Satd. Flow (perm)	0	1155	0	0	1189	0	1687	1776	1509	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			22				77			197
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	81	190	98	75	175	130	59	566	68	123	1105	173
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	11%	11%	11%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	92	216	111	85	199	148	67	643	77	140	1256	197
Lane Group Flow (vph)	0	419	0	0	432	0	67	643	77	140	1256	197
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	10.0	63.0	63.0	17.0	70.0	70.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	8.3%	52.5%	52.5%	14.2%	58.3%	58.3%
Maximum Green (s)	34.0	34.0		34.0	34.0		4.0	57.0	57.0	11.0	64.0	64.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		36.0			36.0		6.0	59.3	59.3	12.7	66.0	66.0
Actuated g/C Ratio		0.30			0.30		0.05	0.49	0.49	0.11	0.55	0.55
v/c Ratio		1.17			1.16		0.80	0.73	0.10	0.74	1.23	0.21
Control Delay		140.8			135.0		110.3	30.4	3.9	75.8	137.2	2.3
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		140.8			135.0		110.3	30.4	3.9	75.8	137.2	2.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			F		F	C	A	E	F	A
Approach Delay		140.8			135.0			34.6			115.1	
Approach LOS		F			F			C			F	
Queue Length 50th (ft)		~381			~385		52	385	0	107	~1199	0
Queue Length 95th (ft)		#564			#570		#132	515	24	#195	#1408	31
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		357			372		84	877	784	192	1025	959
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		1.17			1.16		0.80	0.73	0.10	0.73	1.23	0.21

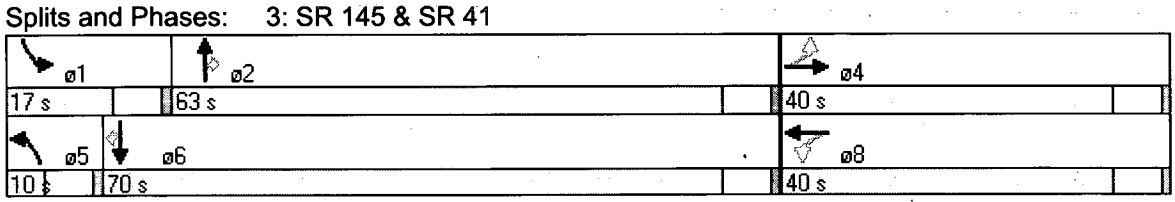
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.23
Intersection Signal Delay: 101.5 Intersection LOS: F
Intersection Capacity Utilization 99.9% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	0		0	0		0	1		1	1		1
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
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.944				0.850			0.850
Flt Protected		0.981			0.993		0.950			0.950		
Satd. Flow (prot)	0	1728	0	0	1549	0	1770	1863	1583	1770	1863	1583
Flt Permitted		0.548			0.854		0.950			0.950		
Satd. Flow (perm)	0	965	0	0	1332	0	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			35				98			107
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	173	236	27	62	176	171	81	1000	93	81	969	99
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	7%	15%	15%	15%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	197	268	31	70	200	194	92	1136	106	92	1101	112
Lane Group Flow (vph)	0	496	0	0	464	0	92	1136	106	92	1101	112
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	51.0	51.0	0.0	51.0	51.0	0.0	10.0	59.0	59.0	10.0	59.0	59.0
Total Split (%)	42.5%	42.5%	0.0%	42.5%	42.5%	0.0%	8.3%	49.2%	49.2%	8.3%	49.2%	49.2%
Maximum Green (s)	45.0	45.0		45.0	45.0		4.0	53.0	53.0	4.0	53.0	53.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)		47.0			47.0		6.0	55.0	55.0	6.0	55.0	55.0
Actuated g/C Ratio		0.39			0.39		0.05	0.46	0.46	0.05	0.46	0.46
v/c Ratio		1.31			0.85		1.03	1.33	0.14	1.03	1.29	0.14
Control Delay		187.3			47.5		160.5	186.2	4.7	160.5	168.9	4.3
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		187.3			47.5		160.5	186.2	4.7	160.5	168.9	4.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			D		F	F	A	F	F	A
Approach Delay		187.3			47.5			170.0			154.2	
Approach LOS		F			D			F			F	
Queue Length 50th (ft)		~495			304		~77	~1143	3	~77	~1086	2
Queue Length 95th (ft)		#687			#479		#182	#1354	33	#182	#1298	32
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)		380			543		89	854	779	89	854	784
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		1.31			0.85		1.03	1.33	0.14	1.03	1.29	0.14

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.33
Intersection Signal Delay: 150.9 Intersection LOS: F
Intersection Capacity Utilization 117.2% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41

ø1	ø2	ø4
10 s	59 s	51 s
ø5	ø6	ø8
10 s	59 s	51 s

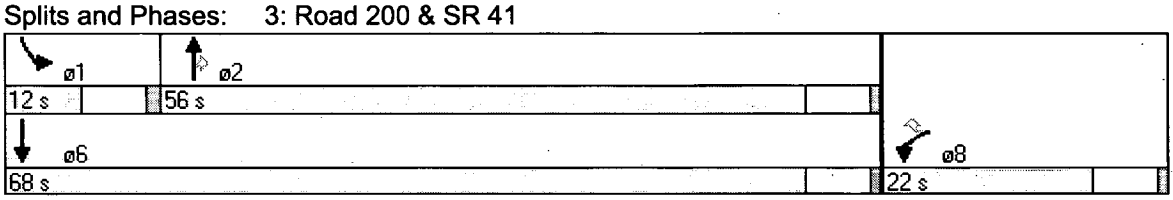
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	500	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1687	1509	1827	1553	1736	1827
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1687	1509	1827	1553	1736	1827
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		68		129		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	4332		3092			2876
Travel Time (s)	53.7		38.3			35.7
Volume (vph)	120	63	683	119	99	1132
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	7%	4%	4%	4%	4%
Adj. Flow (vph)	130	68	742	129	108	1230
Lane Group Flow (vph)	130	68	742	129	108	1230
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	22.0
Total Split (s)	22.0	22.0	56.0	56.0	12.0	68.0
Total Split (%)	24.4%	24.4%	62.2%	62.2%	13.3%	75.6%
Maximum Green (s)	16.0	16.0	50.0	50.0	6.0	62.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	13.6	13.6	57.6	57.6	8.0	67.0
Actuated g/C Ratio	0.16	0.16	0.68	0.68	0.09	0.79
v/c Ratio	0.50	0.23	0.60	0.12	0.68	0.85
Control Delay	39.4	10.3	13.5	1.9	61.0	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.4	10.3	13.5	1.9	61.0	17.0
LOS	D	B	B	A	E	B
Approach Delay	29.4		11.8			20.5
Approach LOS	C		B			C

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	65	0	242	0	57	414
Queue Length 95th (ft)	118	34	415	22	#140	#940
Internal Link Dist (ft)	4252		3012			2796
Turn Bay Length (ft)					500	
Base Capacity (vph)	331	351	1241	1096	159	1443
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.19	0.60	0.12	0.68	0.85

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 84.8
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 18.1 Intersection LOS: B
Intersection Capacity Utilization 72.9% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Road 200 & SR 41



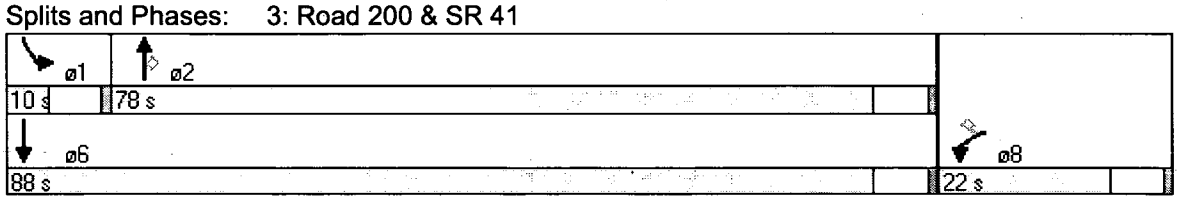
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	500	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1752	1845
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	1863	1583	1752	1845
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		107		170		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	4332		3092			2876
Travel Time (s)	53.7		38.3			35.7
Volume (vph)	108	98	1183	183	67	859
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	117	107	1286	199	73	934
Lane Group Flow (vph)	117	107	1286	199	73	934
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	22.0
Total Split (s)	22.0	22.0	78.0	78.0	10.0	88.0
Total Split (%)	20.0%	20.0%	70.9%	70.9%	9.1%	80.0%
Maximum Green (s)	16.0	16.0	72.0	72.0	4.0	82.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	14.0	14.0	76.2	76.2	6.0	84.1
Actuated g/C Ratio	0.13	0.13	0.72	0.72	0.06	0.79
v/c Ratio	0.50	0.35	0.96	0.17	0.75	0.64
Control Delay	50.3	11.4	33.6	1.7	92.2	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.3	11.4	33.6	1.7	92.2	7.5
LOS	D	B	C	A	F	A
Approach Delay	31.7		29.4			13.7
Approach LOS	C		C			B

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	75	0	760	5	50	214
Queue Length 95th (ft)	132	48	#1229	29	#133	379
Internal Link Dist (ft)	4252		3012			2796
Turn Bay Length (ft)					500	
Base Capacity (vph)	290	349	1338	1185	97	1463
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.31	0.96	0.17	0.75	0.64

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 106.1
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 23.7 Intersection LOS: C
Intersection Capacity Utilization 75.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Road 200 & SR 41



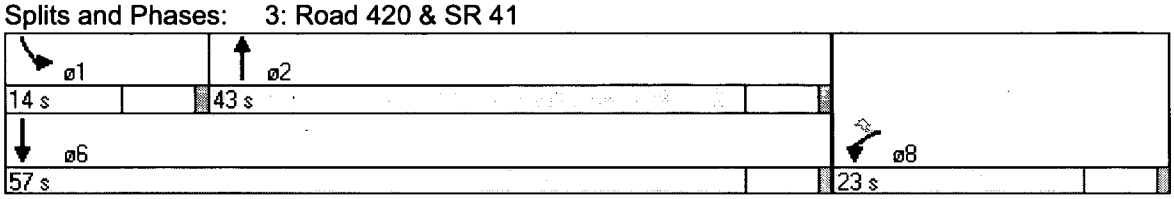
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.997			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3461	0	1752	3505
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	3461	0	1752	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		62	3			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	5640		3602			3534
Travel Time (s)	69.9		44.7			43.8
Volume (vph)	68	57	1087	20	69	845
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Adj. Flow (vph)	74	62	1182	22	75	918
Lane Group Flow (vph)	74	62	1204	0	75	918
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	22.0	22.0	22.0		10.0	22.0
Total Split (s)	23.0	23.0	43.0	0.0	14.0	57.0
Total Split (%)	28.8%	28.8%	53.8%	0.0%	17.5%	71.3%
Maximum Green (s)	17.0	17.0	37.0		8.0	51.0
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	Max		None	Max
Act Effct Green (s)	11.3	11.3	51.9		10.1	64.4
Actuated g/C Ratio	0.13	0.13	0.64		0.12	0.79
v/c Ratio	0.31	0.23	0.55		0.36	0.33
Control Delay	30.6	10.0	11.3		33.7	3.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	30.6	10.0	11.3		33.7	3.4
LOS	C	A	B		C	A
Approach Delay	21.2		11.3			5.7
Approach LOS	C		B			A
Queue Length 50th (ft)	29	0	176		30	55
Queue Length 95th (ft)	65	30	266		70	96

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Internal Link Dist (ft)	5560		3522			3454
Turn Bay Length (ft)						
Base Capacity (vph)	383	391	2200		220	2763
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.19	0.16	0.55		0.34	0.33

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 81.7
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 9.5 Intersection LOS: A
Intersection Capacity Utilization 48.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Road 420 & SR 41



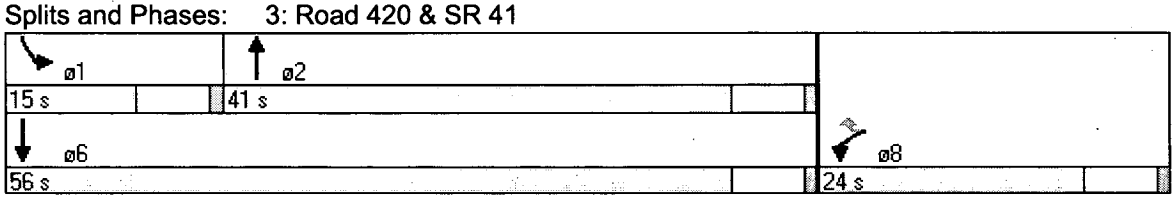
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.996			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1736	1553	3525	0	1770	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1736	1553	3525	0	1770	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		61	5			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55		55			55
Link Distance (ft)	5640		3602			3534
Travel Time (s)	69.9		44.7			43.8
Volume (vph)	29	56	1055	31	70	1066
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	2%	2%	2%	2%
Adj. Flow (vph)	32	61	1147	34	76	1159
Lane Group Flow (vph)	32	61	1181	0	76	1159
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Detector Phases	8	8	2		1	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	22.0	22.0	22.0		10.0	22.0
Total Split (s)	24.0	24.0	41.0	0.0	15.0	56.0
Total Split (%)	30.0%	30.0%	51.3%	0.0%	18.8%	70.0%
Maximum Green (s)	18.0	18.0	35.0		9.0	50.0
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	Max		None	Max
Act Effct Green (s)	9.6	9.6	50.4		10.7	63.6
Actuated g/C Ratio	0.12	0.12	0.64		0.13	0.80
v/c Ratio	0.16	0.26	0.53		0.33	0.41
Control Delay	28.3	10.9	10.6		30.5	3.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	28.3	10.9	10.6		30.5	3.3
LOS	C	B	B		C	A
Approach Delay	16.9		10.6			5.0
Approach LOS	B		B			A
Queue Length 50th (ft)	12	0	161		29	67
Queue Length 95th (ft)	35	30	242		66	107

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Internal Link Dist (ft)	5560		3522			3454
Turn Bay Length (ft)						
Base Capacity (vph)	395	401	2244		252	2837
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.08	0.15	0.53		0.30	0.41

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 79.3
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 8.1 Intersection LOS: A
Intersection Capacity Utilization 47.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Road 420 & SR 41



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1792	1524	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1792	1524	1719	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		508				853
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	142	757	691	541	203	983
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	6%	6%	5%	5%	5%	5%
Adj. Flow (vph)	161	860	785	615	231	1117
Lane Group Flow (vph)	161	860	785	615	231	1117
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases	4	4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	31.0	31.0	50.0	89.0	39.0	39.0
Total Split (%)	25.8%	25.8%	41.7%	74.2%	32.5%	32.5%
Maximum Green (s)	25.0	25.0	44.0	83.0	33.0	33.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	27.0	27.0	46.0	85.0	35.0	35.0
Actuated g/C Ratio	0.22	0.22	0.38	0.71	0.29	0.29
v/c Ratio	0.40	1.17	1.19	0.48	0.46	1.06
Control Delay	43.1	107.5	134.8	9.2	38.4	56.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	107.5	134.8	9.2	38.4	56.2
LOS	D	F	F	A	D	E
Approach Delay	97.4			79.6	53.2	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	F			E	D	
Queue Length 50th (ft)	107	~468	~734	188	146	~450
Queue Length 95th (ft)	169	#679	#941	251	219	#665
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	403	737	659	1282	501	1053
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	1.17	1.19	0.48	0.46	1.06

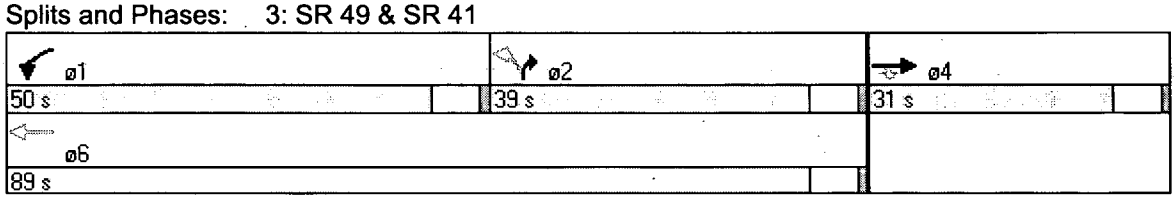
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 75.0 Intersection LOS: E
Intersection Capacity Utilization 91.8% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		471				792
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	208	865	780	678	321	987
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	236	983	886	770	365	1122
Lane Group Flow (vph)	236	983	886	770	365	1122
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases		4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	34.0	34.0	50.0	86.0	36.0	36.0
Total Split (%)	28.3%	28.3%	41.7%	71.7%	30.0%	30.0%
Maximum Green (s)	28.0	28.0	44.0	80.0	30.0	30.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	30.0	30.0	46.0	82.0	32.0	32.0
Actuated g/C Ratio	0.25	0.25	0.38	0.68	0.27	0.27
v/c Ratio	0.51	1.31	1.30	0.60	0.77	1.12
Control Delay	43.2	170.6	180.2	12.8	53.1	80.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.2	170.6	180.2	12.8	53.1	80.2
LOS	D	F	F	B	D	F
Approach Delay	145.9			102.3	73.5	
Approach LOS	F			F	E	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	158	~693	~881	292	262	~519
Queue Length 95th (ft)	233	#906	#1091	386	#369	#734
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	466	749	679	1273	472	1003
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	1.31	1.30	0.60	0.77	1.12

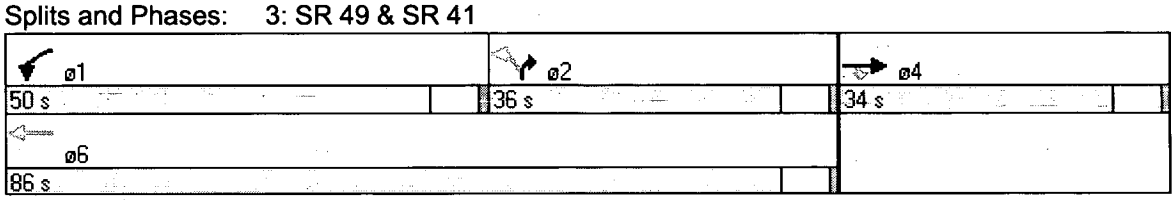
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.31
Intersection Signal Delay: 104.7 Intersection LOS: F
Intersection Capacity Utilization 103.4% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 49 & SR 41



ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2030 Project AM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2030

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225 | North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	57	101	159	69	110	56
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	85	26	49	23	38	50
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	178	159	203	63	125	49	69	56
% Heavy Vehicles	2	0	3	3	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.4	0.0	0.4	0.0	0.8	0.0	0.4	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.7	0.2	-0.6	0.4	-0.7	0.2	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.16	0.14	0.18	0.06	0.11	0.04	0.06	0.05
hd, final value (s)	5.92	5.01	6.02	5.12	6.60	5.49	6.50	5.61
x, final value	0.29	0.22	0.34	0.09	0.23	0.07	0.12	0.09
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.6	2.7	3.7	2.8	4.3	3.2	4.2	3.3

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	428	409	453	313	375	299	319	306
Delay (s/veh)	11.05	9.12	11.78	8.33	11.26	8.63	10.12	8.84
LOS	B	A	B	A	B	A	B	A
Approach: Delay (s/veh)	10.14		10.96		10.52		9.55	
LOS	B		B		B		A	
Intersection Delay (s/veh)	10.37							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2030 Project PM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2030

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	57	180	88	22	126	65
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	95	9	15	61	12	94
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	268	88	168	73	117	15	82	106
% Heavy Vehicles	2	0	2	2	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.1	0.0	0.9	0.0	0.8	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.7	0.1	-0.7	0.5	-0.7	0.5	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.24	0.08	0.15	0.06	0.10	0.01	0.07	0.09
hd, final value (s)	5.91	5.06	6.00	5.23	6.80	5.61	6.70	5.58
x, final value	0.44	0.12	0.28	0.11	0.22	0.02	0.15	0.16
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.6	2.8	3.7	2.9	4.5	3.3	4.4	3.3

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	518	338	418	323	367	265	332	356
Delay (s/veh)	13.17	8.47	11.03	8.55	11.42	8.45	10.61	9.38
LOS	B	A	B	A	B	A	B	A
Approach: Delay (s/veh)	12.00		10.28		11.09		9.91	
LOS	B		B		B		A	
Intersection Delay (s/veh)	10.99							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mammoth Pool Rd / Rd 225
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		103	6	64	46	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	78
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				19		69
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	72	52	0	0	117	6
Percent Heavy Vehicles	0	0	0	3	0	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		72	21		78			
C (m) (veh/h)		1464	642		929			
v/c		0.05	0.03		0.08			
95% queue length		0.16	0.10		0.27			
Control Delay (s/veh)		7.6	10.8		9.2			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.6					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Road 225
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road	North/South Street: Mammoth Pool Rd / Rd 225
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		60	16	90	85	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	14	0	93
Percent Heavy Vehicles	0	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				13		82
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	102	96	0	0	68	18
Percent Heavy Vehicles	0	0	0	8	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		102	14		93			
C (m) (veh/h)		1504	571		967			
v/c		0.07	0.02		0.10			
95% queue length		0.22	0.08		0.32			
Control Delay (s/veh)		7.6	11.5		9.1			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.4					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road | North/South Street: Mission Drive

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		62	15	2	76	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	70	17	2	86	0
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	13		6			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	14	0	6	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		2		20				
C (m) (veh/h)		1496		864				
v/c		0.00		0.02				
95% queue length		0.00		0.07				
Control Delay (s/veh)		7.4		9.3				
LOS		A		A				
Approach Delay (s/veh)	--	--	9.3					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Cascadel Rd @ Mission Dr
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Cascadel Road | North/South Street: Mission Drive

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		106	9	7	88	
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	120	10	7	100	0
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	6		7			
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	6	0	7	0	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		7		13				
C (m) (veh/h)		1455		833				
v/c		0.00		0.02				
95% queue length		0.01		0.05				
Control Delay (s/veh)		7.5		9.4				
LOS		A		A				
Approach Delay (s/veh)	--	--	9.4					
Approach LOS	--	--	A					

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 Project AM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd | North/South Street: Northfork Rd / Rd 200

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	7	203	29	244	160	7
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	1	1	1	18	2	31
Percent Heavy Vehicles	5	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	1	16	2	28
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	277	181	7	7	230	32
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	7	277		51			3	
C (m) (veh/h)	1368	1285		353			243	
v/c	0.01	0.22		0.14			0.01	
95% queue length	0.02	0.82		0.50			0.04	
Control Delay (s/veh)	7.6	8.6		16.9			20.0	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	16.9			20.0		
Approach LOS	--	--	C			C		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Northfork Rd / Auberry Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/1/06	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Auberry Rd	North/South Street: Northfork Rd / Rd 200
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	6	178	26	45	197	4
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	4	2	11	37	2	37
Percent Heavy Vehicles	5	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	2	10	33	2	33
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	51	223	4	6	202	29
Percent Heavy Vehicles	2	2	2	3	3	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	L		LTR			LTR	
v (veh/h)	6	51		76			17	
C (m) (veh/h)	1324	1337		558			597	
v/c	0.00	0.04		0.14			0.03	
95% queue length	0.01	0.12		0.47			0.09	
Control Delay (s/veh)	7.7	7.8		12.5			11.2	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	12.5			11.2		
Approach LOS	--	--	B			B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	2030 Project AM

Site Information

Intersection	Northfork Rd @ Crane Valley Rd
Jurisdiction	Madera County
Analysis Year	2030

Project Description 04-837.1 Northfork Casino Alt D

East/West Street: Northfork Rd / Rd 200 | North/South Street: Crane (SB) / Northfork (NB)

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	96	57			51	88
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	109	64	0	0	57	100
Percent Heavy Vehicles	0	–	–	6	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				41		98
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	46	0	111
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	109						157	
C (m) (veh/h)	1435						795	
v/c	0.08						0.20	
95% queue length	0.25						0.73	
Control Delay (s/veh)	7.7						10.6	
LOS	A						B	
Approach Delay (s/veh)	–	–				10.6		
Approach LOS	–	–				B		

Copyright © 2005 University of Florida, All Rights Reserved

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	S. Leon	Intersection	Northfork Rd @ Crane Valley Rd
Agency/Co.	TPG Consulting	Jurisdiction	Madera County
Date Performed	8/2/06	Analysis Year	2030
Analysis Time Period	2030 Project PM		

Project Description	04-837.1 Northfork Casino Alt D
East/West Street: Northfork Rd / Rd 200	North/South Street: Crane (SB) / Northfork (NB)
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	126	53			63	46
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	143	60	0	0	71	52
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				78		124
Peak-Hour Factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	88	0	140
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	143						228	
C (m) (veh/h)	1477						723	
v/c	0.10						0.32	
95% queue length	0.32						1.35	
Control Delay (s/veh)	7.7						12.3	
LOS	A						B	
Approach Delay (s/veh)	--	--	12.3					
Approach LOS	--	--	B					

Copyright © 2005 University of Florida, All Rights Reserved

ATTACHMENT VI – C - 51

2030 PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: MALUM RIDGE ROAD Critical Approach Speed 55/25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

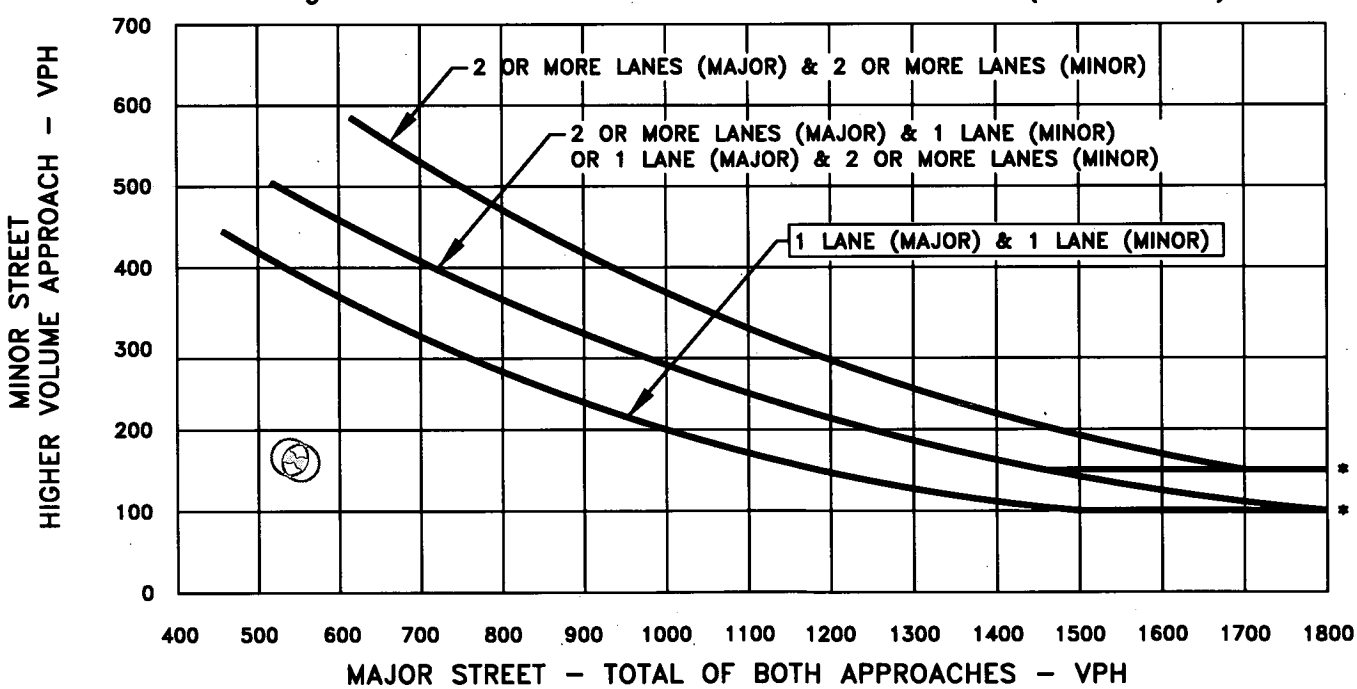
CONDITION: 2030 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		552	538			
Highest Approaches – Minor Street	✓		160	167			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 225 (MAMMOTH POOL ROAD) Critical Approach Speed 35 mph

MINOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

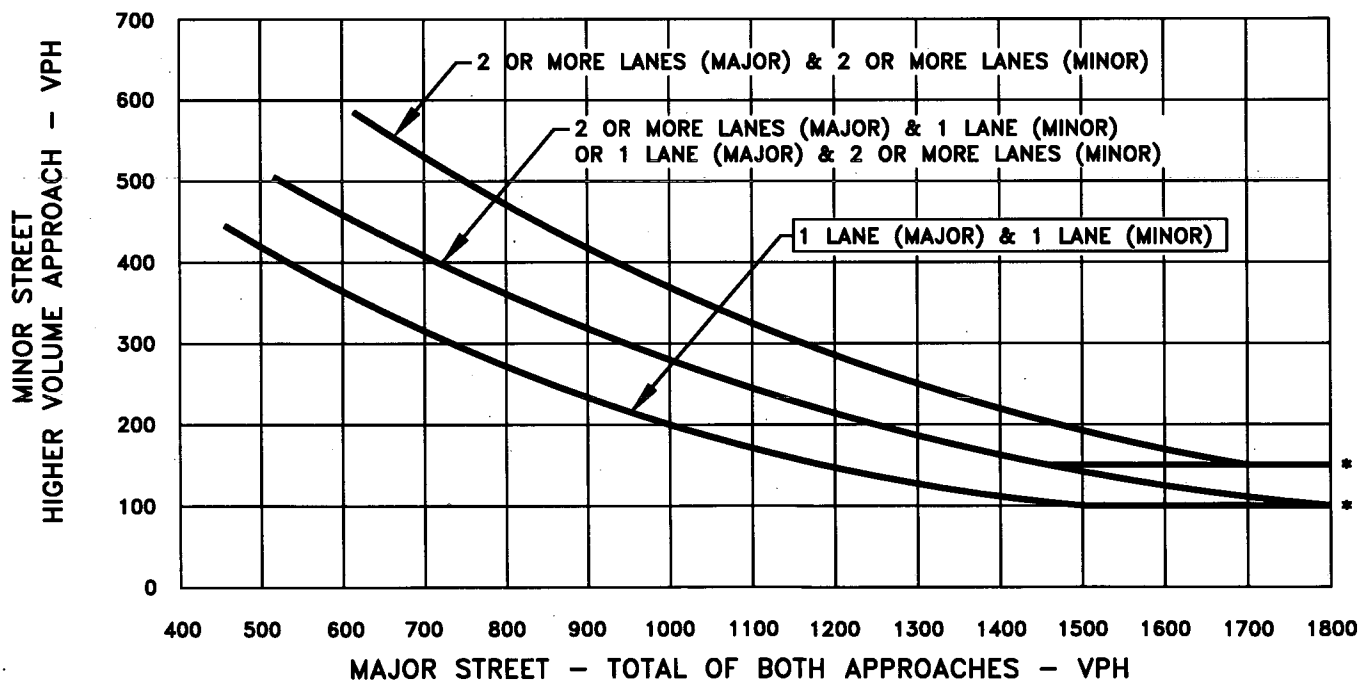
CONDITION: 2030 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		219	251			
Highest Approaches – Minor Street	✓		86	95			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: CASCADEL ROAD Critical Approach Speed NPS mph

MINOR STREET: MISSION DRIVE Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☒ URBAN (U)

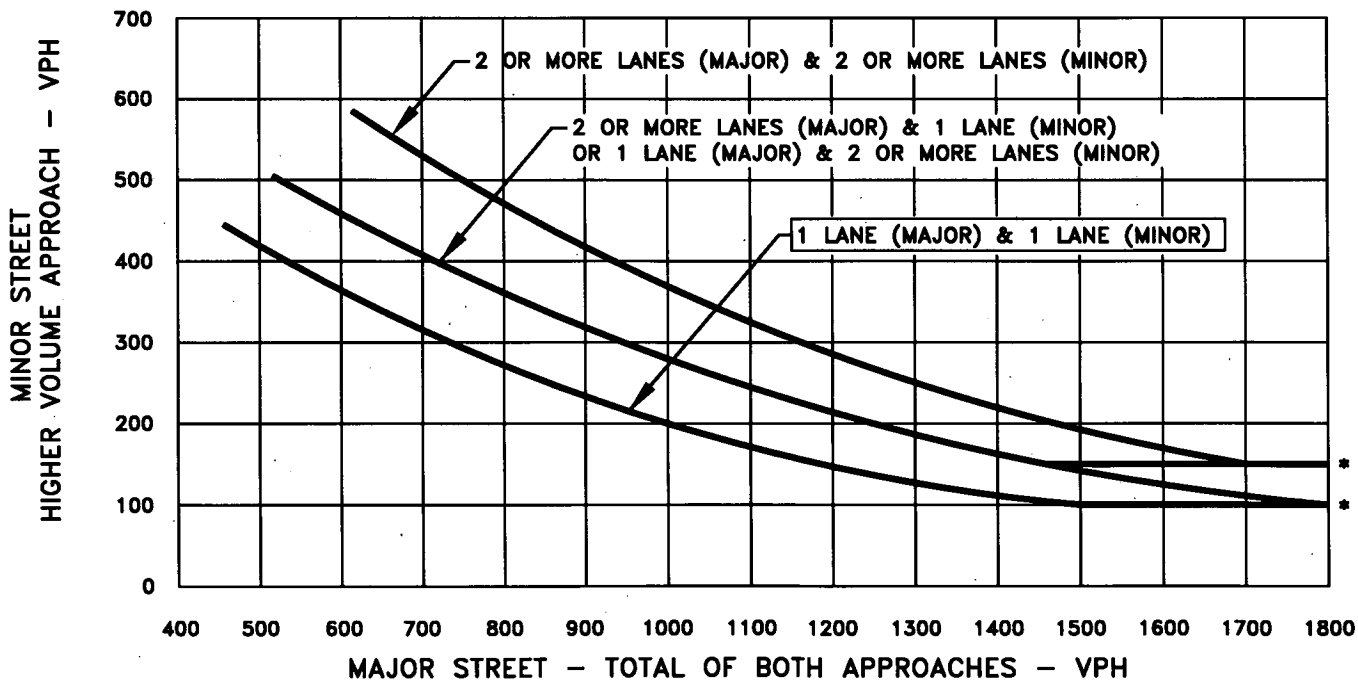
CONDITION: 2030 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM	PM PEAK			Hour
Both Approaches – Major Street	✓		159	210			
Highest Approaches – Minor Street	✓		19	13			

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–3 PEAK HOUR VOLUME WARRANT (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.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: AUBERRY ROAD Critical Approach Speed NPS mph

Critical speed of major street traffic > 40 mph ---------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. -------- [ ] URBAN (U)

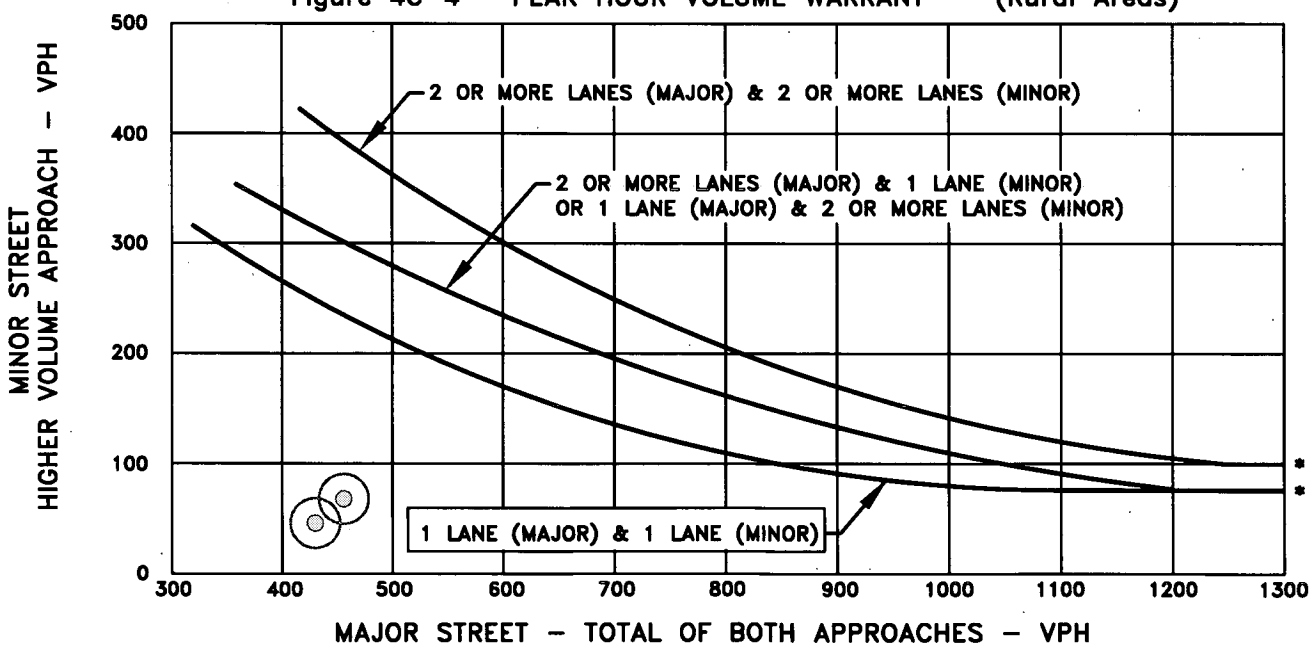
CONDITION: 2030 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		430	456				
Highest Approaches – Minor Street	✓		46	68				

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

TRAFFIC SIGNAL WARRANTS

CALC SL DATE 08/01/06 CHK _____ DATE _____

MAJOR STREET: ROAD 200 (NORTHFORK ROAD) Critical Approach Speed 55 mph

MINOR STREET: CRANE VALLEY ROAD Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☐

☐ URBAN (U)

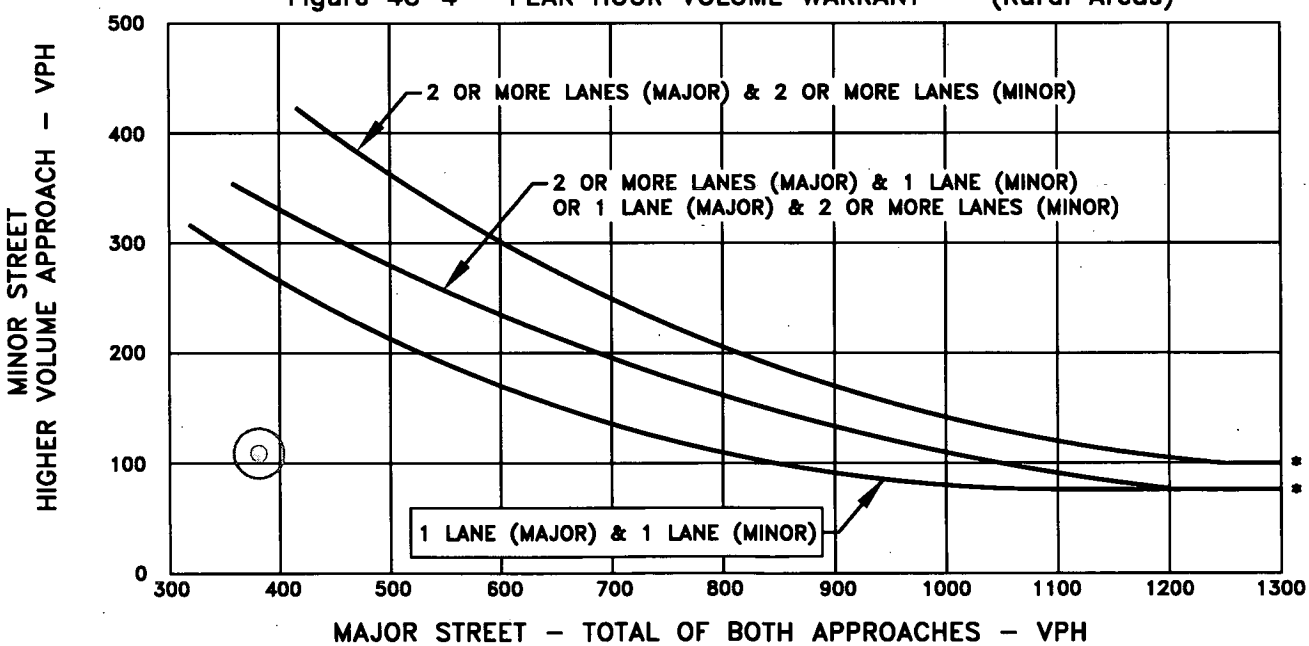
CONDITION: 2030 PROJECT ALT D

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		292	381				
Highest Approaches – Minor Street	✓		139	109				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG CONSULTING INCORPORATED

ATTACHMENT VI – C - 52

MITIGATED 2030 PROJECT CONDITIONS

NORTH FORK SITE - ALTERNATIVE D

INTERSECTION LEVEL OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	1		1	1		1	1		1	1		1
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
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1671	1759	1495	1626	1712	1455	1687	3374	1509	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1671	1759	1495	1626	1712	1455	1687	3374	1509	1770	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			111			148			77			197
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	81	190	98	75	175	130	59	566	68	123	1105	173
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	8%	8%	8%	11%	11%	11%	7%	7%	7%	2%	2%	2%
Adj. Flow (vph)	92	216	111	85	199	148	67	643	77	140	1256	197
Lane Group Flow (vph)	92	216	111	85	199	148	67	643	77	140	1256	197
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	11.0	22.0	22.0	11.0	22.0	22.0	10.0	31.0	31.0	16.0	37.0	37.0
Total Split (%)	13.8%	27.5%	27.5%	13.8%	27.5%	27.5%	12.5%	38.8%	38.8%	20.0%	46.3%	46.3%
Maximum Green (s)	5.0	16.0	16.0	5.0	16.0	16.0	4.0	25.0	25.0	10.0	31.0	31.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	7.0	15.0	15.0	7.0	15.0	15.0	6.0	30.7	30.7	11.0	35.2	35.2
Actuated g/C Ratio	0.09	0.20	0.20	0.09	0.20	0.20	0.08	0.41	0.41	0.14	0.47	0.47
v/c Ratio	0.60	0.61	0.28	0.57	0.57	0.36	0.50	0.46	0.11	0.55	0.75	0.23
Control Delay	52.9	35.4	7.9	51.4	34.5	7.7	49.5	20.5	5.4	39.8	22.6	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.9	35.4	7.9	51.4	34.5	7.7	49.5	20.5	5.4	39.8	22.6	3.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	A	D	C	A	D	C	A	D	C	A
Approach Delay		31.9			28.7			21.5			21.7	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	45	96	0	41	88	0	32	133	0	64	283	0
Queue Length 95th (ft)	#107	160	37	#99	149	42	#79	183	26	118	367	35
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)	154	415	437	149	403	456	134	1398	670	275	1677	854
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.52	0.25	0.57	0.49	0.32	0.50	0.46	0.11	0.51	0.75	0.23

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74.2
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 23.9 Intersection LOS: C
Intersection Capacity Utilization 61.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41

ø1	ø2	ø3	ø4
16 s	31 s	11 s	22 s
ø5	ø6	ø7	ø8
10 s	37 s	11 s	22 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	450		450	450		450
Storage Lanes	1		1	1		1	1		1	1		1
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
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	1776	1509	1570	1652	1404	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1687	1776	1509	1570	1652	1404	1770	3539	1583	1770	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			31			156			106			112
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		55			55			55			35	
Link Distance (ft)		5272			4872			3377			3871	
Travel Time (s)		65.4			60.4			41.9			75.4	
Volume (vph)	173	236	27	62	176	171	81	1000	93	81	969	99
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	7%	7%	7%	15%	15%	15%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	197	268	31	70	200	194	92	1136	106	92	1101	112
Lane Group Flow (vph)	197	268	31	70	200	194	92	1136	106	92	1101	112
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
Detector Phases	7	4	4	3	8	8	5	2	2	1	6	6
Minimum Initial (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
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	15.0	24.0	24.0	13.0	22.0	22.0	10.0	33.0	33.0	10.0	33.0	33.0
Total Split (%)	18.8%	30.0%	30.0%	16.3%	27.5%	27.5%	12.5%	41.3%	41.3%	12.5%	41.3%	41.3%
Maximum Green (s)	9.0	18.0	18.0	7.0	16.0	16.0	4.0	27.0	27.0	4.0	27.0	27.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	11.1	20.4	20.4	8.7	15.2	15.2	6.0	29.3	29.3	6.0	29.3	29.3
Actuated g/C Ratio	0.15	0.27	0.27	0.11	0.20	0.20	0.08	0.39	0.39	0.08	0.39	0.39
v/c Ratio	0.79	0.56	0.07	0.40	0.60	0.48	0.67	0.83	0.16	0.67	0.80	0.16
Control Delay	57.7	31.1	9.5	40.0	36.1	11.9	61.0	28.7	4.6	61.0	27.4	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.7	31.1	9.5	40.0	36.1	11.9	61.0	28.7	4.6	61.0	27.4	4.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	C	A	D	D	B	E	C	A	E	C	A
Approach Delay		40.3			26.5			29.0			27.8	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	96	118	0	33	89	15	45	268	0	45	256	0
Queue Length 95th (ft)	#205	191	19	71	150	66	#114	#381	29	#114	#337	30
Internal Link Dist (ft)		5192			4792			3297			3791	
Turn Bay Length (ft)							450		450	450		450
Base Capacity (vph)	249	497	445	182	383	445	138	1376	680	138	1376	684
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.54	0.07	0.38	0.52	0.44	0.67	0.83	0.16	0.67	0.80	0.16

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.3
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 29.8 Intersection LOS: C
Intersection Capacity Utilization 64.3% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 145 & SR 41

ø1	ø2	ø3	ø4
10 s	33 s	13 s	24 s
ø5	ø6	ø7	ø8
10 s	33 s	15 s	22 s

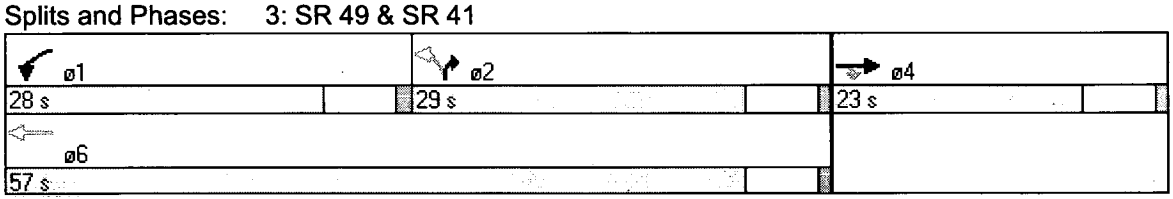
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	0.88	0.97	1.00	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1792	2682	3335	1810	3335	2707
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1792	2682	3335	1810	3335	2707
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		860				1117
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	142	757	691	541	203	983
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	6%	6%	5%	5%	5%	5%
Adj. Flow (vph)	161	860	785	615	231	1117
Lane Group Flow (vph)	161	860	785	615	231	1117
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases	4	4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	23.0	23.0	28.0	57.0	29.0	29.0
Total Split (%)	28.8%	28.8%	35.0%	71.3%	36.3%	36.3%
Maximum Green (s)	17.0	17.0	22.0	51.0	23.0	23.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	13.9	13.9	20.2	39.7	15.3	15.3
Actuated g/C Ratio	0.22	0.22	0.33	0.64	0.25	0.25
v/c Ratio	0.40	0.68	0.72	0.53	0.28	0.74
Control Delay	26.1	5.1	24.5	8.4	21.1	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	5.1	24.5	8.4	21.1	5.0
LOS	C	A	C	A	C	A
Approach Delay	8.4			17.4	7.8	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	A			B	A	
Queue Length 50th (ft)	53	0	129	109	38	0
Queue Length 95th (ft)	119	42	242	201	68	39
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	520	1389	1242	1280	1186	1682
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.62	0.63	0.48	0.19	0.66

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 62.1
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 11.5 Intersection LOS: B
Intersection Capacity Utilization 52.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: SR 49 & SR 41



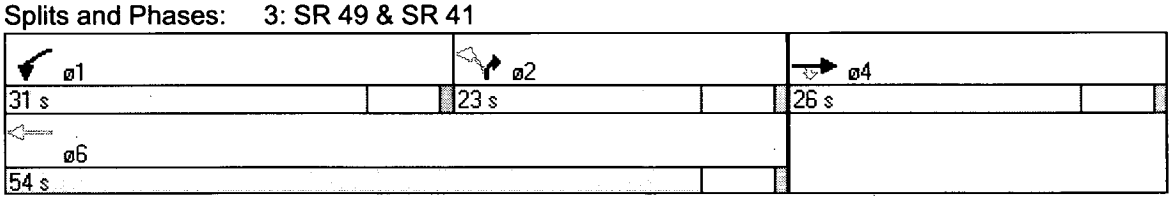
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱↱	↰↰	↑	↰↰	↱↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	0.88	0.97	1.00	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	2787	3433	1863	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	2787	3433	1863	3433	2787
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		810				440
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	55			55	55	
Link Distance (ft)	4456			2936	3312	
Travel Time (s)	55.2			36.4	41.1	
Volume (vph)	208	865	780	678	321	387
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	236	983	886	770	365	440
Lane Group Flow (vph)	236	983	886	770	365	440
Turn Type		Perm	Prot			custom
Protected Phases	4		1			2
Permitted Phases		4		6	2	
Detector Phases	4	4	1	6	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	26.0	26.0	31.0	54.0	23.0	23.0
Total Split (%)	32.5%	32.5%	38.8%	67.5%	28.8%	28.8%
Maximum Green (s)	20.0	20.0	25.0	48.0	17.0	17.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	16.9	16.9	22.9	41.9	14.7	14.7
Actuated g/C Ratio	0.25	0.25	0.34	0.62	0.22	0.22
v/c Ratio	0.50	0.75	0.76	0.66	0.49	0.46
Control Delay	27.1	8.9	25.5	12.2	26.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	8.9	25.5	12.2	26.9	4.6
LOS	C	A	C	B	C	A
Approach Delay	12.4			19.3	14.7	
Approach LOS	B			B	B	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Length 50th (ft)	90	35	174	192	75	0
Queue Length 95th (ft)	160	94	260	322	117	34
Internal Link Dist (ft)	4376			2856	3232	
Turn Bay Length (ft)						
Base Capacity (vph)	579	1425	1325	1243	936	1080
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.69	0.67	0.62	0.39	0.41

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 67.2
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 59.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: SR 49 & SR 41



ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	Mitigated 2030 Project AM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2030

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	57	101	159	69	110	56
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	85	26	49	23	38	50
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	TR	L	TR	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	64	260	78	188	125	49	69	56
% Heavy Vehicles	2	0	3	3	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	1.0	0.0	1.0	0.0	0.8	0.0	0.4	0.0
Prop. Right-Turns	0.0	0.6	0.0	0.3	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.5	-0.4	0.6	-0.2	0.4	-0.7	0.2	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.06	0.23	0.07	0.17	0.11	0.04	0.06	0.05
hd, final value (s)	6.24	5.27	6.30	5.57	6.58	5.46	6.47	5.58
x, final value	0.11	0.38	0.14	0.29	0.23	0.07	0.12	0.09
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.9	3.0	4.0	3.3	4.3	3.2	4.2	3.3

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	314	510	328	438	375	299	319	306
Delay (s/veh)	9.71	11.18	10.00	10.54	11.22	8.60	10.09	8.81
LOS	A	B	A	B	B	A	B	A
Approach: Delay (s/veh)	10.89		10.38		10.48		9.52	
LOS	B		B		B		A	
Intersection Delay (s/veh)	10.47							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 10/4/2006 6:26 PM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	S. Leon
Agency/Co.	TPG Consulting
Date Performed	8/2/06
Analysis Time Period	Mitigated 2030 Project PM

Site Information

Intersection	Road 225 @ Road 274
Jurisdiction	Madera County
Analysis Year	2030

Project ID 04-837.1 Northfork Casino Alt D

East/West Street: Mammoth Pool / Rd 225

North/South Street: Malum Ridge Rd / Rd 274

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	57	180	88	22	126	65
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	95	9	15	61	12	94
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	TR	L	TR	LT	R	LT	R
PHF	0.88	1.00	0.88	0.88	0.88	1.00	0.88	0.88
Flow Rate (veh/h)	64	268	25	216	117	15	82	106
% Heavy Vehicles	2	0	2	2	2	0	2	2
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	1.0	0.0	1.0	0.0	0.9	0.0	0.8	0.0
Prop. Right-Turns	0.0	0.3	0.0	0.3	0.0	1.0	0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.5	-0.2	0.5	-0.2	0.5	-0.7	0.5	-0.7

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.06	0.24	0.02	0.19	0.10	0.01	0.07	0.09
hd, final value (s)	6.28	5.52	6.39	5.65	6.75	5.56	6.65	5.53
x, final value	0.11	0.41	0.04	0.34	0.22	0.02	0.15	0.16
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	4.0	3.2	4.1	3.4	4.5	3.3	4.4	3.2

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	314	518	275	466	367	265	332	356
Delay (s/veh)	9.77	12.01	9.39	11.23	11.34	8.39	10.54	9.31
LOS	A	B	A	B	B	A	B	A
Approach: Delay (s/veh)	11.57		11.04		11.01		9.84	
LOS	B		B		B		A	
Intersection Delay (s/veh)	10.98							
Intersection LOS	B							

Copyright © 2005 University of Florida, All Rights Reserved

HCS+™ Version 5.2

Generated: 10/4/2006 6:25 PM

ATTACHMENT VI – C - 53

RAW COUNT DATA

Site Name	EB AVENUE 18 1/2 W/O ROAD 24
Jurisdiction	
Study Type	Volume (ch1)
Location Code	8974
Direction	East
Date	11/30/2004
Real Time	11:35
Start Date	11/30/2004
Start Time	12:00
Sample Time	00:15
Operator Number	43
Machine Number	24

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	11	4	2	3	2
01	11	4	5	2	0
02	9	4	1	0	4
03	4	2	1	1	0
04	10	2	1	3	4
05	27	7	3	8	9
06	83	14	9	33	27
07	83	19	21	15	28
08	84	33	15	21	15
09	67	25	14	11	17
10	75	13	20	21	21
11	69	15	15	24	15
12	93	22	23	21	27
13	103	26	12	35	30
14	121	28	32	35	26
15	84	27	19	16	22
16	98	26	26	15	31
17	80	17	19	21	23
18	52	17	8	14	13
19	46	11	8	13	14
20	30	7	12	4	7
21	33	10	13	3	7
22	27	5	9	8	5
23	11	4	1	3	3
	1311	Total			

Site Name	EB AVENUE 18 1/2 W/O ROAD 24
Jurisdiction	
Study Type	Volume (ch1)
Location Code	8974
Direction	East
Date	11/30/2004
Real Time	11:35
Start Date	11/30/2004
Start Time	12:00
Sample Time	00:15
Operator Number	43
Machine Number	24

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	11	4	2	3	2
01	11	4	5	2	0
02	9	4	1	0	4
03	4	2	1	1	0
04	10	2	1	3	4
05	27	7	3	8	9
06	83	14	9	33	27
07	83	19	21	15	28
08	84	33	15	21	15
09	67	25	14	11	17
10	75	13	20	21	21
11	69	15	15	24	15
12	93	22	23	21	27
13	103	26	12	35	30
14	121	28	32	35	26
15	84	27	19	16	22
16	98	26	26	15	31
17	80	17	19	21	23
18	52	17	8	14	13
19	46	11	8	13	14
20	30	7	12	4	7
21	33	10	13	3	7
22	27	5	9	8	5
23	11	4	1	3	3
	1311	Total			

Site Name	EB AVENUE 17 E/O ROAD 23
Jurisdiction	
Study Type	Volume (2-way)
Location Code	8977
Direction	East
Date	11/30/2004
Real Time	11:57
Start Date	11/30/2004
Start Time	12:00
Sample Time	00:15
Operator Number	43
Machine Number	15

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	9	4	3	0	2
01	1	1	0	0	0
02	3	0	1	1	1
03	7	1	3	2	1
04	5	2	1	1	1
05	17	1	4	3	9
06	25	0	5	9	11
07	61	10	11	23	17
08	48	18	11	7	12
09	32	1	8	11	12
10	29	5	11	5	8
11	37	12	8	13	4
12	44	10	13	9	12
13	73	9	30	19	15
14	69	12	18	11	28
15	57	12	16	23	6
16	72	16	13	17	26
17	51	11	22	12	6
18	21	10	4	3	4
19	12	2	4	2	4
20	10	6	1	1	2
21	10	2	3	3	2
22	7	2	3	1	1
23	11	2	4	0	5
	711	Total			

Site Name	WB AVENUE 17 E/O ROAD 23
Jurisdiction	
Study Type	Volume (ch1)
Location Code	8976
Direction	West
Date	11/30/2004
Real Time	11:57
Start Date	11/30/2004
Start Time	12:00
Sample Time	00:15
Operator Number	43
Machine Number	15

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	9	1	4	2	2
01	1	1	0	0	0
02	1	0	0	1	0
03	3	1	0	1	1
04	11	2	2	5	2
05	31	7	3	8	13
06	60	10	14	21	15
07	76	10	15	21	30
08	50	21	15	7	7
09	27	6	4	11	6
10	41	8	9	8	16
11	47	7	6	16	18
12	47	14	6	15	12
13	43	15	7	14	7
14	62	9	21	20	12
15	61	17	9	24	11
16	57	18	14	9	16
17	39	10	14	6	9
18	22	6	6	7	3
19	16	3	4	6	3
20	9	3	3	0	3
21	5	4	0	0	1
22	6	2	0	4	0
23	6	1	1	3	1
	730	Total			

Site Name	EB AVENUE 17 E/O SR 99
Jurisdiction	
Study Type	Volume (2-way)
Location Code	8979
Direction	East
Date	11/30/2004
Real Time	12:28
Start Date	11/30/2004
Start Time	13:00
Sample Time	00:15
Operator Number	43
Machine Number	27

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	67	17	24	14	12
01	28	9	10	8	1
02	25	6	5	8	6
03	26	9	7	7	3
04	61	6	12	18	25
05	191	34	42	53	62
06	329	59	68	102	100
07	618	110	144	176	188
08	414	139	95	98	82
09	355	88	73	102	92
10	337	69	88	81	99
11	362	78	89	104	91
12	455	112	107	121	115
13	488	132	122	132	102
14	502	86	125	159	132
15	633	152	122	206	153
16	684	174	164	164	182
17	753	194	222	186	151
18	475	162	130	102	81
19	305	87	63	72	83
20	229	63	52	55	59
21	187	58	39	42	48
22	113	36	30	24	23
23	65	20	24	13	8
	7702	Total			

Site Name	WB AVENUE 17 E/O SR 99
Jurisdiction	
Study Type	Volume (ch1)
Location Code	8978
Direction	West
Date	11/30/2004
Real Time	12:28
Start Date	11/30/2004
Start Time	13:00
Sample Time	00:15
Operator Number	43
Machine Number	27

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	34	8	7	9	10
01	24	7	8	7	2
02	18	3	6	4	5
03	39	8	8	9	14
04	88	6	17	27	38
05	275	48	56	78	93
06	436	98	94	118	126
07	759	145	180	212	222
08	328	111	79	77	61
09	303	88	72	71	72
10	273	63	75	65	70
11	261	63	48	79	71
12	311	64	87	84	76
13	352	97	89	86	80
14	343	88	93	95	67
15	387	121	84	94	88
16	319	89	79	69	82
17	388	91	127	87	83
18	231	72	71	38	50
19	134	42	41	29	22
20	107	31	29	19	28
21	97	18	29	32	18
22	49	15	11	13	10
23	35	5	12	15	3
	5591	Total			

Site Name	EB AVENUE 17 W/O D STREET
Jurisdiction	
Study Type	Volume (2-way)
Location Code	8981
Direction	East
Date	11/30/2004
Real Time	12:57
Start Date	11/30/2004
Start Time	13:00
Sample Time	00:15
Operator Number	43
Machine Number	2

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	19	6	4	5	4
01	13	1	6	4	2
02	11	4	2	3	2
03	7	0	3	2	2
04	15	0	2	11	2
05	33	7	4	12	10
06	43	1	14	12	16
07	139	15	38	39	47
08	118	36	24	35	23
09	101	20	27	26	28
10	115	28	22	30	35
11	137	34	29	37	37
12	163	38	39	49	37
13	166	38	33	51	44
14	177	41	36	60	40
15	221	44	51	71	55
16	255	51	72	70	62
17	275	62	68	82	63
18	155	53	37	34	31
19	111	24	30	31	26
20	102	36	22	27	17
21	63	18	13	17	15
22	44	21	5	13	5
23	21	5	9	4	3
	2504	Total			

Site Name	WB AVENUE 17 W/O D STREET
Jurisdiction	
Study Type	Volume (ch1)
Location Code	8980
Direction	West
Date	11/30/2004
Real Time	12:57
Start Date	11/30/2004
Start Time	13:00
Sample Time	00:15
Operator Number	43
Machine Number	2

Tuesday, November 30, 2004

	Channel 1				
HR Begin	HR Total	00-15	15-30	30-45	45-00
00	12	4	0	6	2
01	9	4	3	2	0
02	8	2	2	2	2
03	15	0	3	4	8
04	48	4	11	22	11
05	98	11	26	28	33
06	169	26	33	51	59
07	189	40	38	54	57
08	120	47	23	33	17
09	115	26	29	31	29
10	98	20	23	33	22
11	112	28	28	30	26
12	124	45	25	32	22
13	106	27	25	30	24
14	143	26	43	38	36
15	187	53	43	48	43
16	163	31	43	49	40
17	205	65	48	48	44
18	132	43	21	32	36
19	88	23	27	16	22
20	57	22	12	13	10
21	56	13	22	12	9
22	31	6	8	10	7
23	21	7	2	9	3
	2306	Total			

Wednesday 7/26/06	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	7	0	14	3	1	42	4	10	1	9	14	9	0	67	6	16
7:15-7:30	16	0	28	11	8	73	6	19	4	14	26	20	0	124	14	39
7:30-7:45	19	0	43	13	12	100	6	27	8	28	39	28	0	176	25	56
7:45-8:00	29	0	60	18	14	142	9	36	9	38	51	36	0	227	31	76
8:00-8:15	38	0	70	20	19	169	10	43	11	42	65	45	0	268	36	89
8:15-8:30	44	0	79	23	22	203	10	50	13	47	80	55	0	310	49	105
8:30-8:45	52	0	87	27	24	231	10	56	15	53	97	63	0	368	57	126
8:45-9:00	60	0	102	34	25	278	13	70	16	63	126	83	0	421	67	143
Wednesday 7/26/06																
PM																
4:00-4:15	4	0	1	3	0	43	6	11	5	15	23	19	0	59	11	15
4:15-4:30	6	0	4	4	3	79	10	21	7	30	46	34	0	140	18	36
4:30-4:45	10	0	11	6	11	126	23	29	13	41	68	51	0	206	23	54
4:45-5:00	12	0	22	9	12	175	36	42	15	47	103	70	0	269	34	68
5:00-5:15	18	0	32	11	17	209	48	48	25	57	132	94	0	339	41	85
5:15-5:30	21	0	40	14	20	259	63	59	34	66	159	114	0	408	49	103
5:30-5:45	27	0	49	17	21	290	72	66	36	72	177	126	0	475	55	126
5:45-6:00	33	0	57	22	23	333	77	75	38	78	197	140	0	542	61	146

Intersection: Avenue 18 1/2 at SR 99 SB / Road 23

Wednesday 7/26/06	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	31	0	4	14	0	18	3	4	0	0	0	0	34	8	0	22
7:15-7:30	63	0	10	28	0	32	10	5	0	0	0	0	66	18	0	50
7:30-7:45	89	0	13	38	0	53	18	9	0	0	0	0	91	33	0	64
7:45-8:00	129	0	20	52	0	73	22	9	0	0	0	0	125	41	0	80
8:00-8:15	152	0	24	59	0	85	24	10	0	0	0	0	148	48	0	89
8:15-8:30	187	0	34	70	0	96	26	10	0	0	0	0	177	64	0	107
8:30-8:45	215	0	37	78	0	104	27	11	0	0	0	0	201	72	0	123
8:45-9:00	257	0	41	93	0	122	29	16	0	0	0	0	231	76	0	140
Wednesday 7/26/06																
PM																
4:00-4:15	21	0	1	6	0	39	1	5	0	0	0	0	7	29	0	13
4:15-4:30	56	0	8	18	0	47	4	6	0	0	0	0	39	39	0	19
4:30-4:45	100	0	16	27	0	69	7	8	0	0	0	0	70	51	0	31
4:45-5:00	144	0	23	40	0	99	8	11	0	0	0	0	88	67	0	35
5:00-5:15	180	0	36	47	0	111	9	14	0	0	0	0	115	80	0	46
5:15-5:30	231	0	45	60	0	135	12	15	0	0	0	0	139	99	0	50
5:30-5:45	260	0	49	67	0	150	13	16	0	0	0	0	161	115	0	60
5:45-6:00	304	0	55	79	0	165	14	16	0	0	0	0	179	127	0	64

Intersection: Avenue 18 1/2 at SR 99 NB

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	2	19	0	2	0	1	1	1	1	11	0	6	1	3	2	0
7:15-7:30	2	43	0	2	0	1	1	1	1	31	0	10	1	3	4	0
7:30-7:45	7	62	0	6	0	2	1	1	2	48	1	12	1	6	4	0
7:45-8:00	13	96	0	12	0	5	1	1	4	66	2	14	2	7	8	0
8:00-8:15	13	105	0	15	0	5	1	1	6	74	3	17	2	10	9	2
8:15-8:30	15	117	0	19	0	5	2	1	6	88	3	22	3	12	10	2
8:30-8:45	15	124	0	20	0	5	3	1	7	100	3	26	4	14	11	2
8:45-9:00	17	140	0	21	0	5	3	1	7	109	3	28	4	17	12	2
PM																
4:00-4:15	3	18	0	4	0	0	3	0	2	22	0	3	0	1	2	1
4:15-4:30	5	34	1	8	0	5	5	0	4	41	0	7	0	2	3	1
4:30-4:45	8	50	1	9	0	6	7	0	5	68	1	13	1	5	5	1
4:45-5:00	12	74	2	11	0	7	8	0	7	93	1	15	1	9	5	1
5:00-5:15	15	89	2	14	0	9	9	0	7	115	3	19	2	10	8	1
5:15-5:30	20	103	2	14	0	11	13	0	7	128	3	22	3	11	9	1
5:30-5:45	21	110	2	14	0	11	13	0	9	139	3	24	3	12	9	1
5:45-6:00	22	122	2	14	0	12	16	0	10	145	3	26	3	12	11	1

Intersection: Avenue 18 @ Road 23

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	16	4		0	3	0		0	13	0		1	1	0	
7:15-7:30	0	40	7		16	3	0		1	32	0		1	2	1	
7:30-7:45	1	59	9		40	8	2		1	47	0		1	9	1	
7:45-8:00	3	86	20		57	9	3		8	62	0		1	21	4	
8:00-8:15	4	108	31		63	11	3		8	72	0		1	27	7	
8:15-8:30	6	123	37		70	14	5		9	87	0		1	29	10	
8:30-8:45	8	131	43		72	16	7		10	102	0		2	32	10	
8:45-9:00	9	145	48		74	17	8		11	110	0		2	35	12	
PM																
4:00-4:15	1	22	16		16	2	4		5	21	2		2	39	14	
4:15-4:30	1	36	30		20	7	6		6	41	2		2	39	15	
4:30-4:45	1	54	39		27	11	7		11	69	2		2	45	16	
4:45-5:00	3	82	47		32	13	8		13	87	2		3	50	17	
5:00-5:15	3	99	58		40	16	11		15	113	2		3	55	18	
5:15-5:30	4	115	63		41	21	11		16	124	2		3	58	18	
5:30-5:45	6	123	71		47	25	13		19	137	2		3	67	21	
5:45-6:00	8	137	77		51	29	14		20	144	2		3	69	22	

Intersection: Avenue 17 @ Road 23

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	0	4	2	22	7	0	0	7	0	0	0	0	9	2	0
7:15-7:30	2	0	9	4	29	16	1	1	4	0	0	0	0	2	4	0
7:30-7:45	1	0	7	2	25	31	5	3	3	0	0	0	0	11	0	0
7:45-8:00	1	0	15	3	27	20	3	3	6	1	1	0	0	21	4	0
8:00-8:15	1	0	4	1	24	17	2	0	3	0	0	0	0	17	3	1
8:15-8:30	1	0	13	3	16	27	3	1	4	1	0	0	1	6	2	0
8:30-8:45	1	0	15	0	15	8	1	2	5	0	0	0	0	12	0	0
8:45-9:00	1	0	10	5	13	5	0	1	4	0	0	0	0	11	2	0
PM																
4:00-4:15	5	1	47	2	15	14	6	4	4	0	0	0	2	22	2	0
4:15-4:30	0	1	32	0	10	11	6	2	1	0	1	0	0	20	1	0
4:30-4:45	4	0	23	3	16	9	2	2	4	0	0	0	0	18	1	0
4:45-5:00	0	1	20	1	11	11	3	2	7	0	0	0	0	19	2	0
5:00-5:15	0	0	26	0	6	11	4	1	8	0	0	0	0	17	0	0
5:15-5:30	1	2	11	3	3	9	3	0	4	0	0	0	0	15	0	0
5:30-5:45	0	0	7	0	1	11	0	1	3	0	0	0	0	16	1	1
5:45-6:00	0	1	7	2	3	8	5	2	1	0	0	0	0	13	1	2

Intersection: Avenue 17 at Airport Drive

Ave17@SR99SBoff

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	0	0	0	0	24	0	1	9	0	3	1	0	21	0	4
7:15-7:30	0	0	0	0	0	44	0	3	18	0	5	1	0	40	1	9
7:30-7:45	0	0	0	0	0	65	0	6	31	0	7	1	0	59	1	11
7:45-8:00	0	0	0	0	0	118	0	8	49	0	9	3	0	104	4	16
8:00-8:15	0	0	0	0	0	152	0	8	57	0	12	3	0	130	7	17
8:15-8:30	0	0	0	0	0	204	0	8	62	0	14	4	0	160	10	19
8:30-8:45	0	0	0	0	0	226	0	11	68	0	17	4	0	188	10	21
8:45-9:00	0	0	0	0	0	251	0	16	79	0	17	4	0	221	12	23
PM																
4:00-4:15	0	0	0	0	0	31	0	4	23	0	8	4	0	76	0	4
4:15-4:30	0	0	0	0	0	61	0	6	45	0	11	4	0	136	0	5
4:30-4:45	0	0	0	0	0	80	0	7	65	0	16	6	0	177	0	6
4:45-5:00	0	0	0	0	0	102	0	8	88	0	18	8	0	229	0	9
5:00-5:15	0	0	0	0	0	125	0	10	113	0	27	20	0	281	0	9
5:15-5:30	0	0	0	0	0	140	0	10	135	0	36	20	0	317	0	12
5:30-5:45	0	0	0	0	0	151	0	11	152	0	46	20	0	344	0	13
5:45-6:00	0	0	0	0	0	171	0	12	171	0	57	20	0	377	0	15

Intersection: Avenue 17 @ SR 99 SB off-ramp

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	1	0	0	0	24	1	0	0	12	0	3	5	8	0	0
7:15-7:30	22	20	13	1	0	139	4	1	0	25	0	3	10	15	0	0
7:30-7:45	45	21	23	3	0	326	25	2	0	28	0	3	14	39	0	1
7:45-8:00	74	21	42	4	0	424	42	4	0	28	0	3	16	53	0	2
8:00-8:15	91	21	69	4	0	491	38	4	0	28	0	3	17	70	0	2
8:15-8:30	120	21	88	5	0	547	58	4	0	28	0	3	17	83	0	3
8:30-8:45	141	21	110	9	0	612	64	5	0	28	0	3	20	105	0	4
8:45-9:00	149	21	127	12	0	653	71	6	0	28	0	3	21	117	0	6
PM																
4:00-4:15	15	0	64	0	0	66	13	4	0	0	0	0	4	55	0	3
4:15-4:30	30	0	144	3	0	131	22	7	0	1	0	0	8	106	0	3
4:30-4:45	41	0	215	5	0	190	35	8	0	1	0	0	11	156	0	4
4:45-5:00	51	0	284	6	0	252	50	9	0	1	0	0	12	213	0	7
5:00-5:15	59	0	377	6	0	335	59	11	0	2	0	0	18	275	0	7
5:15-5:30	65	0	458	6	0	388	67	11	0	2	0	0	19	299	0	7
5:30-5:45	70	0	556	7	0	441	77	12	0	2	0	0	19	340	0	8
5:45-6:00	72	0	587	7	0	482	86	12	0	2	0	0	20	363	0	9

Intersection: Avenue 17 @ SR 99 NB off-ramp

Turns

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	0	2	1	22	3	2	4	0	2	3	0	48	1	0	0
7:15-7:30	0	2	5	1	44	5	4	5	0	5	6	1	92	2	2	2
7:30-7:45	0	2	7	1	90	10	6	8	0	8	11	2	159	4	4	2
7:45-8:00	0	3	10	1	133	17	10	9	0	9	15	5	233	6	6	3
8:00-8:15	0	4	11	1	165	20	11	10	0	12	18	6	281	7	12	4
8:15-8:30	0	5	12	1	196	21	13	11	0	15	18	9	326	7	14	4
8:30-8:45	0	6	15	1	224	26	15	12	0	22	19	9	342	9	15	6
8:45-9:00	0	8	15	2	249	28	17	13	0	25	20	9	365	10	16	8
PM																
4:00-4:15	0	3	3	1	89	5	6	3	0	5	2	0	72	2	6	0
4:15-4:30	0	4	8	2	146	9	6	6	0	9	5	1	131	4	11	0
4:30-4:45	0	5	15	3	238	11	8	7	0	15	10	1	193	7	19	2
4:45-5:00	0	6	20	5	331	16	17	9	1	20	15	1	254	8	29	3
5:00-5:15	0	11	28	5	406	24	25	10	1	24	18	1	350	10	35	3
5:15-5:30	0	13	39	7	484	31	30	15	2	27	19	1	414	11	36	3
5:30-5:45	0	13	43	8	540	35	34	17	2	37	23	3	476	14	36	4
5:45-6:00	0	14	48	8	611	37	39	22	2	38	24	3	525	16	39	4

Intersection: AVE 16 @ SCHNOOR & GOLDEN STATE BLVD

SR 99 SB RAMP @ AVE 16 - 4-7

	ON RAMP								OFF RAMP							
	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	8	0	2		47		3			14	3	5		1	1
7:15-7:30	44	19	0	2		102		4			26	3	13		1	1
7:30-7:45	104	37	0	6		173		5			54	5	42		1	4
7:45-8:00	138	49	0	7		238		5			74	7	72		2	1
8:00-8:15	174	53	0	8		291		9			92	7	91		2	5
8:15-8:30	207	63	0	10		364		12			121	8	122		4	6
8:30-8:45	238	72	0	10		393		12			130	10	149		4	7
8:45-9:00	265	86	1	10		417		12			147	10	175		5	9
PM																
4:00-4:15	58	26		1		81		1			19	0	51		1	0
4:15-4:30	134	50		2		161		1			36	0	107		1	5
4:30-4:45	200	68		3		253		3			50	0	145		1	5
4:45-5:00	284	92		5		333		4			63	0	206		4	6
5:00-5:15	336	107		7		436		4			87	0	261		4	6
5:15-5:30	395	123		12		513		7			104	1	335		5	8
5:30-5:45	458	143		13		593		10			115	2	362		5	9
5:45-6:00	504	159		16		658		10			126	2	396		5	9

Intersection: SR 99 SB RAMP @ AVE 16

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	24	0	5	0	0	0	0	0	6	13	1	42	0	0	1
7:15-7:30	0	33	0	6	0	0	0	0	0	6	20	1	87	0	0	1
7:30-7:45	0	51	0	9	0	0	0	0	0	6	30	3	134	0	0	4
7:45-8:00	0	64	0	11	0	0	0	0	0	7	40	4	170	0	0	5
8:00-8:15	0	77	0	12	0	0	0	0	0	7	50	4	201	0	0	5
8:15-8:30	0	92	0	15	0	0	0	0	0	7	68	5	240	0	0	10
8:30-8:45	0	103	0	16	0	0	0	0	0	7	75	5	263	0	0	10
8:45-9:00	0	107	0	18	0	0	0	0	0	9	82	5	273	0	0	11
PM																
4:00-4:15	0	15	0	3	0	0	0	0	0	2	22	1	41	0	0	0
4:15-4:30	0	22	0	4	0	0	0	0	0	4	37	1	91	0	0	2
4:30-4:45	0	41	0	5	0	0	0	0	0	6	65	2	147	0	0	4
4:45-5:00	0	62	0	5	0	0	0	0	0	6	82	3	171	0	0	6
5:00-5:15	0	87	0	5	0	0	0	0	0	9	112	5	241	0	0	7
5:15-5:30	0	104	0	6	0	0	0	0	0	9	127	5	292	0	0	7
5:30-5:45	0	123	0	9	0	0	0	0	0	10	142	5	330	0	0	7
5:45-6:00	0	135	0	9	0	0	0	0	0	11	164	6	364	0	0	7

Intersection: Avenue 16/Avenue 16 connector at SR 99 NB ramps

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	0	0	0	0	8	0	0	0	6	13	1	42	19	0	1
7:15-7:30	0	0	0	0	0	16	0	0	0	6	20	1	87	36	0	2
7:30-7:45	0	0	0	0	0	30	0	1	0	6	30	3	134	58	0	6
7:45-8:00	0	0	0	0	0	56	0	1	0	7	40	4	170	100	0	8
8:00-8:15	0	0	0	0	0	71	0	1	0	7	50	4	201	141	0	13
8:15-8:30	0	0	0	0	0	92	0	1	0	7	68	5	240	178	0	19
8:30-8:45	0	0	0	0	0	106	0	1	0	7	75	5	263	189	0	21
8:45-9:00	0	0	0	0	0	114	0	2	0	9	82	5	273	198	0	21
PM																
4:00-4:15	0	0	0	0	0	29	0	1	0	0	22	0	55	57	0	2
4:15-4:30	0	0	0	0	0	38	0	1	0	0	37	2	78	83	0	5
4:30-4:45	0	0	0	0	0	69	0	3	0	0	64	3	131	116	0	5
4:45-5:00	0	0	0	0	0	88	0	3	0	0	80	5	152	160	0	7
5:00-5:15	0	0	0	0	0	116	0	3	0	0	105	7	208	217	0	7
5:15-5:30	0	0	0	0	0	134	0	5	0	0	120	9	256	241	0	14
5:30-5:45	0	0	0	0	0	177	0	5	0	0	142	11	321	288	0	16
5:45-6:00	0	0	0	0	0	189	0	5	0	0	164	11	346	306	0	19

Intersection: Avenue 16 at SR 99 NB ramps connector

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	8	24	6	6	0	0	0	0	19	0	0	0	0	0	0
7:15-7:30	0	16	33	7	6	0	0	0	0	36	0	1	0	0	0	0
7:30-7:45	0	30	50	10	6	0	0	0	0	58	0	3	0	0	0	0
7:45-8:00	0	56	64	13	7	0	0	0	0	100	0	4	0	0	0	0
8:00-8:15	0	71	77	14	7	0	0	0	0	141	0	9	0	0	0	0
8:15-8:30	0	92	92	16	7	0	0	0	0	178	0	10	0	0	0	0
8:30-8:45	0	106	103	18	7	0	0	0	0	189	0	11	0	0	0	0
8:45-9:00	0	114	107	21	9	0	0	0	0	198	0	11	0	0	0	0
PM																
4:00-4:15	0	27	15	0	2	0	0	0	0	57	0	0	0	0	0	0
4:15-4:30	0	37	22	0	3	0	0	0	0	83	0	0	0	0	0	0
4:30-4:45	0	68	40	0	6	0	0	0	0	115	0	0	0	0	0	0
4:45-5:00	0	88	61	0	6	0	0	0	0	159	0	0	0	0	0	0
5:00-5:15	0	116	86	0	7	0	0	0	0	218	0	0	0	0	0	0
5:15-5:30	0	134	102	0	9	0	0	0	0	245	0	0	0	0	0	0
5:30-5:45	0	178	121	0	9	0	0	0	0	284	0	0	0	0	0	0
5:45-6:00	0	188	134	0	10	0	0	0	0	305	0	0	0	0	0	0

Intersection: Gateway/Avenue 16 at SR 99 NB ramps

ELLIS @ ROAD 26

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	1	69	1	4	2	1	0	1	6	41	1	1	0	1	2	0
7:15-7:30	2	223	1	4	5	1	6	2	11	94	2	4	0	2	4	0
7:30-7:45	6	434	3	4	9	1	16	4	19	192	2	4	5	2	5	1
7:45-8:00	10	546	4	5	11	1	20	4	26	278	2	7	6	2	6	1
8:00-8:15	14	677	8	5	14	1	28	4	32	362	3	9	6	2	8	1
8:15-8:30	16	791	8	5	22	1	30	4	35	446	6	9	7	2	12	1
8:30-8:45	21	860	9	6	23	1	32	4	35	520	6	10	7	2	14	1
8:45-9:00	26	966	11	7	25	1	38	5	43	573	9	10	7	3	18	1
PM																
4:00-4:15	3	187	12	1	9	0	9	0	4	82	10	2				
4:15-4:30	7	375	12	3	14	0	13	0	8	238	16	7				
4:30-4:45	9	519	35	3	19	1	24	0	9	488	28	10				
4:45-5:00	19	632	41	4	21	1	29	1	12	647	38	11				
5:00-5:15	19	759	49	5	37	1	32	1	14	813	49	12				
5:15-5:30	39	892	60	7	48	2	35	1	18	1000	54	12				
5:30-5:45	59	1026	63	8	53	3	39	1	20	1155	61	13				
5:45-6:00	59	1096	67	8	55	4	46	1	22	1256	63	13				

Intersection: ELLIS @ ROAD 26

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	18	1	3	1	0	3	0	0	22	4	3	0	0	0	0
7:15-7:30	0	23	1	3	2	0	4	2	0	22	2	2	0	0	0	0
7:30-7:45	0	36	2	2	9	0	8	2	0	36	9	2	0	0	0	0
7:45-8:00	0	44	2	2	4	1	3	0	0	36	5	6	0	0	0	0
8:00-8:15	0	20	1	3	8	0	7	3	0	34	4	5	0	1	0	0
8:15-8:30	0	12	1	4	4	0	2	1	0	19	7	4	0	1	0	0
8:30-8:45	0	13	7	3	3	0	1	0	0	10	8	2	0	1	0	0
8:45-9:00	0	11	4	4	1	1	1	0	0	13	10	2	0	1	0	0
PM																
4:00-4:15	0	45	11	12	7	2	10	1	1	44	34	8	0	0	0	0
4:15-4:30	0	30	9	7	3	1	13	0	0	18	20	3	0	0	1	0
4:30-4:45	0	26	1	5	2	0	13	0	0	20	18	4	0	0	0	0
4:45-5:00	1	23	3	2	2	0	7	0	0	28	15	2	0	2	0	2
5:00-5:15	0	19	2	3	1	0	8	0	0	23	13	1	0	0	0	0
5:15-5:30	0	8	2	1	3	0	4	0	0	12	7	5	0	0	0	0
5:30-5:45	2	17	3	1	5	0	8	0	0	18	12	4	0	0	0	0
5:45-6:00	3	20	5	2	8	0	10	0	0	22	15	1	0	0	0	0

Intersection: AVE 15 1/2 @ ROAD 23

12/1/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	2	0	0	48	115	0	54	10	0	11	8	1	77	54	45
7:15-7:30	0	2	1	0	61	147	0	72	4	1	9	4	0	99	70	40
7:30-7:45	0	0	0	0	114	167	0	100	14	0	13	7	0	116	76	50
7:45-8:00	0	0	0	0	129	246	0	104	24	0	12	18	0	198	77	75
8:00-8:15	0	0	0	0	70	197	0	79	14	0	10	12	0	139	65	52
8:15-8:30	0	0	0	0	48	205	0	81	14	0	11	9	0	125	45	48
8:30-8:45	0	0	0	0	30	174	0	67	17	0	14	11	0	94	54	51
8:45-9:00	0	0	0	0	45	183	0	76	19	0	12	7	0	118	51	60
PM																
4:00-4:15	0	7	0	0	79	452	0	85	42	0	16	23	0	297	71	71
4:15-4:30	0	0	0	0	87	384	0	97	42	0	14	22	0	366	94	89
4:30-4:45	0	0	0	0	54	398	0	104	49	1	19	31	0	354	71	109
4:45-5:00	0	0	0	0	56	406	0	120	37	0	14	22	0	249	68	71
5:00-5:15	0	0	0	0	61	409	0	111	41	0	26	26	0	272	77	79
5:15-5:30	0	0	0	0	65	370	0	120	51	0	21	32	0	326	61	47
5:30-5:45	0	0	0	0	67	362	0	101	27	0	17	12	0	311	76	97
5:45-6:00	0	0	0	0	59	299	0	109	17	0	8	9	0	300	41	82

Intersection: Avenue 15 1/2 at SR 99 SB ramps

12/1/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	19	0	38	10	0	116	14	2	0	0	0	0	10	66	0	1
7:15-7:30	36	0	19	11	0	144	20	5	0	0	0	0	11	90	0	0
7:30-7:45	44	0	32	10	0	179	7	8	0	0	0	0	18	98	0	3
7:45-8:00	59	0	55	5	0	198	11	12	0	0	0	0	8	197	2	1
8:00-8:15	56	0	45	8	0	187	11	6	0	0	0	0	14	121	0	0
8:15-8:30	55	0	30	8	0	163	10	7	0	0	0	0	21	120	0	1
8:30-8:45	55	0	28	7	0	141	12	2	0	0	0	0	10	100	0	3
8:45-9:00	42	0	29	5	0	165	7	10	0	0	0	0	11	126	0	3
PM																
4:00-4:15	74	0	88	1	0	246	8	0	0	0	0	0	7	200	0	3
4:15-4:30	59	0	88	0	0	206	1	3	0	0	0	0	11	217	0	1
4:30-4:45	73	0	62	1	0	237	6	0	0	0	0	0	6	241	0	3
4:45-5:00	91	0	67	2	0	242	11	5	0	0	0	0	31	205	2	5
5:00-5:15	86	0	80	4	0	257	4	3	0	0	0	0	7	236	0	6
5:15-5:30	70	0	67	9	0	206	22	5	0	0	0	0	7	240	0	0
5:30-5:45	76	0	64	3	0	234	20	1	0	0	0	0	13	247	1	0
5:45-6:00	49	0	40	0	0	115	11	2	0	0	0	0	13	106	0	2

Intersection: Avenue 15 1/2 at SR 99 NB ramps

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	2	12	3	3	2	9	4	3	3	9	2	1	5	14	11	4
7:15-7:30	0	10	0	1	2	14	3	0	6	1	5	0	3	12	6	1
7:30-7:45	2	10	3	2	2	14	4	0	9	14	7	1	3	15	3	2
7:45-8:00	6	13	3	3	1	12	2	3	5	6	5	1	3	28	6	2
8:00-8:15	2	5	1	1	1	18	2	2	4	7	10	4	1	28	2	1
8:15-8:30	4	21	3	4	2	44	10	7	3	9	8	3	1	40	6	1
8:30-8:45	6	14	6	9	3	40	7	3	4	11	8	4	2	25	12	3
8:45-9:00	2	6	2	1	2	25	3	0	3	4	5	5	2	20	3	2
PM																
4:00-4:15	19	20	2	3	3	51	23	3	19	30	10	14	6	29	22	6
4:15-4:30	8	25	5	1	3	33	13	2	9	28	10	5	4	14	9	3
4:30-4:45	12	20	3	2	5	45	10	1	5	14	6	2	2	25	8	1
4:45-5:00	10	15	4	2	2	25	5	2	6	10	3	3	7	20	5	2
5:00-5:15	5	21	1	4	8	40	11	4	14	20	9	8	4	15	12	1
5:15-5:30	5	10	2	1	1	15	5	1	6	7	4	2	1	12	9	2
5:30-5:45	1	4	1	0	0	10	1	1	3	5	2	2	2	8	2	0
5:45-6:00	5	10	2	1	1	20	2	1	2	4	4	1	1	10	4	1

Intersection:Ave 14 @ Road 23

12/1/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	41	9	4	0	0	0	0	32	61	0	4	37	0	29	1
7:15-7:30	0	81	22	10	0	0	0	0	73	119	0	5	71	0	41	1
7:30-7:45	0	115	32	13	0	0	0	0	119	199	0	10	109	0	57	1
7:45-8:00	0	294	53	16	0	0	0	0	181	303	0	13	136	0	67	4
8:00-8:15	0	385	64	25	0	0	0	0	259	447	0	18	164	0	77	7
8:15-8:30	0	458	79	33	0	0	0	0	304	553	0	30	191	0	81	7
8:30-8:45	0	526	90	39	0	0	0	0	340	645	0	37	251	0	99	7
8:45-9:00	0	599	115	50	0	0	0	0	382	719	0	42	299	0	111	7
PM																
4:00-4:15	0	63	15	2	0	0	0	0	71	141	0	3	23	0	25	1
4:15-4:30	0	159	37	4	0	0	0	0	138	322	0	9	60	0	36	1
4:30-4:45	0	252	56	10	0	0	0	0	191	463	0	9	98	0	42	1
4:45-5:00	0	330	69	13	0	0	0	0	254	576	0	21	120	0	54	5
5:00-5:15	0	437	118	15	0	0	0	0	331	730	0	23	151	0	63	5
5:15-5:30	0	521	131	15	0	0	0	0	388	850	0	27	182	0	76	5
5:30-5:45	0	610	154	15	0	0	0	0	455	971	0	27	248	0	95	5
5:45-6:00	0	703	175	17	0	0	0	0	524	1086	0	33	294	0	102	6

SR 99 NB Ramps @ Olive Ave

12/1/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	VBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	20	0	6	28	0	12	15	0	21	0	8	0	0	0	0
7:15-7:30	0	66	0	17	87	0	33	44	0	87	0	24	0	0	0	0
7:30-7:45	0	135	0	38	100	0	88	64	0	100	0	23	0	0	0	0
7:45-8:00	0	129	0	36	128	0	124	99	0	102	0	34	0	0	0	0
8:00-8:15	0	54	0	17	67	0	32	24	0	90	0	21	0	0	0	0
8:15-8:30	0	61	0	21	59	0	20	40	0	59	0	19	0	0	0	0
8:30-8:45	0	44	0	13	42	0	19	30	0	55	0	29	0	0	0	0
8:45-9:00	0	53	0	18	52	0	19	29	0	71	0	24	0	0	0	0
PM																
4:00-4:15	0	84	0	25	69	1	37	33	0	123	0	34	0	0	0	0
4:15-4:30	0	67	0	16	78	0	41	41	0	123	0	33	0	0	0	0
4:30-4:45	0	75	0	27	78	0	55	43	0	109	0	31	0	0	0	0
4:45-5:00	0	63	0	19	63	0	34	33	0	119	0	31	0	0	0	0
5:00-5:15	0	76	0	18	75	0	28	42	0	112	0	40	0	0	0	0
5:15-5:30	0	69	0	31	83	0	27	41	0	126	2	34	0	0	0	0
5:30-5:45	1	76	0	24	91	0	20	35	0	149	0	39	0	0	0	0
5:45-6:00	1	80	0	29	95	0	30	45	0	126	0	40	0	0	0	0

Intersection: Avenue 14 at SR 99 SB off ramps

12/2/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	0	1	0	0	6	4	2	4	4	8	1	1	13	0	3
7:15-7:30	0	0	0	0	1	42	44	5	21	34	70	12	12	58	2	2
7:30-7:45	0	0	0	0	4	51	67	0	48	34	69	6	49	101	11	7
7:45-8:00	0	0	0	0	2	88	90	4	73	15	117	6	32	94	2	6
8:00-8:15	0	0	0	0	2	60	45	5	47	17	92	15	12	122	2	4
8:15-8:30	0	0	0	0	3	52	29	8	30	15	56	5	20	96	2	1
8:30-8:45	0	0	0	0	2	39	27	5	23	21	56	17	18	67	4	9
8:45-9:00	0	0	0	0	2	37	26	2	36	13	47	7	27	80	3	6
PM																
4:00-4:15	27	113	31	0	0	0	0	0	1	87	47	3	53	33	100	6
4:15-4:30	19	123	5	3	0	0	0	0	2	71	42	5	72	22	79	8
4:30-4:45	12	133	2	6	0	0	0	0	3	64	57	4	64	32	82	4
4:45-5:00	13	130	5	5	0	0	0	0	4	78	38	4	69	26	79	8
5:00-5:15	18	130	8	2	0	0	0	0	6	75	51	1	73	31	86	7
5:15-5:30	18	133	1	6	0	0	0	0	2	46	43	2	63	34	94	5
5:30-5:45	22	137	2	3	0	0	0	0	6	59	46	3	75	27	96	5
5:45-6:00	24	127	3	3	0	0	0	0	5	56	40	2	65	37	98	11

Intersection: SR 99 SB on ramp at SR 145

GOLDEN STATE BLVD AVE 12 @ SR99 SB RAMPS

	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15		8	9	0	13		52	6		11	41	8				
7:15-7:30		30	30	1	29		104	13		28	92	12				
7:30-7:45		41	42	1	38		153	23		42	149	18				
7:45-8:00		50	53	1	48		202	28		53	193	20				
8:00-8:15		66	62	1	57		248	35		68	223	26				
8:15-8:30		78	69	1	66		285	38		77	250	32				
8:30-8:45		91	77	1	80		328	41		83	281	39				
8:45-9:00		98	81	1	84		371	44		93	319	49				
PM																
4:00-4:15		16	10	1	13		70	8		8	60	7				
4:15-4:30		30	17	2	26		121	14		24	106	15				
4:30-4:45		51	28	2	42		201	20		44	157	24				
4:45-5:00		76	44	4	59		282	23		57	234	33				
5:00-5:15		89	55	4	72		365	27		63	291	35				
5:15-5:30		101	71	4	89		431	34		77	324	42				
5:30-5:45		119	83	5	100		511	37		95	372	49				
5:45-6:00		133	97	6	109		586	39		110	412	50				

Intersection: GOLDEN STATE BLVD & AVE 12 @ SR 99 SB RAMPS

15 minute Counts

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	20	0	74	12	34	116	10	12	4	0	2	0	54	48	9	12
7:15-7:30	17	0	54	7	27	84	4	5	1	0	5	0	43	43	3	9
7:30-7:45	15	2	35	8	17	68	6	5	0	2	1	1	38	47	5	8
7:45-8:00	18	3	39	5	20	63	3	7	3	1	3	0	30	47	7	7
8:00-8:15	21	3	43	7	22	51	7	10	4	2	0	0	31	44	2	5
8:15-8:30	27	2	29	5	18	50	1	15	2	2	0	0	21	31	0	11
8:30-8:45	6	0	28	4	18	51	0	11	1	1	1	0	30	35	3	11
8:45-9:00	7	0	24	3	13	26	0	10	2	0	3	0	21	24	4	8
PM																
4:00-4:15	41	3	56	7	23	67	0	15	3	0	3	1	76	108	10	20
4:15-4:30	23	1	40	6	18	50	1	8	3	0	3	0	62	78	9	18
4:30-4:45	21	2	59	7	22	65	1	6	6	2	6	0	60	68	4	12
4:45-5:00	48	2	69	5	25	76	2	10	3	2	3	2	68	112	5	11
5:00-5:15	47	2	71	6	33	69	1	3	6	1	6	1	69	124	4	12
5:15-5:30	33	1	40	8	13	56	1	3	4	1	4	0	47	95	1	9
5:30-5:45	29	0	44	3	16	44	2	4	2	0	2	2	35	58	3	4
5:45-6:00	17	0	39	2	10	33	1	5	0	0	0	0	20	48	0	1

Intersection: GOLDEN STATE BLVD @ AVE 12

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15					70	68		2	35	4	10	5	31	106		6
7:15-7:30					67	51		5	31	0	9	5	34	98		5
7:30-7:45					53	44		7	32	0	10	3	20	101		7
7:45-8:00					55	50		2	37	0	21	10	19	101		4
8:00-8:15					61	59		2	27	0	12	4	24	111		8
8:15-8:30					49	64		4	13	0	7	6	37	62		3
8:30-8:45					43	61		3	27	0	8	9	42	60		10
8:45-9:00					70	70		3	20	0	5	9	34	58		9
PM																
4:00-4:15					66	62		3	35	0	21	10	41	138		7
4:15-4:30					64	45		6	34	1	15	3	21	109		7
4:30-4:45					47	43		4	32	0	24	2	17	98		4
4:45-5:00					54	43		8	30	0	19	3	15	106		8
5:00-5:15					57	50		2	28	0	25	4	25	110		5
5:15-5:30					45	60		2	20	0	30	2	30	60		2
5:30-5:45					40	50		1	23	0	32	1	35	77		14
5:45-6:00					60	64		5	29	0	39	0	39	60		7

Intersection: AVE 12 @ SR 99 NB RAMPS

Wednesday 7/26/06	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15						51	3	22	6		21	3	1	55		18
7:15-7:30						85	3	41	6		22	6	1	97		34
7:30-7:45						109	9	53	19		29	8	1	131		46
7:45-8:00						152	13	68	30		35	13	7	177		63
8:00-8:15						186	23	81	40		35	14	11	209		77
8:15-8:30						214	47	96	51		38	16	19	240		90
8:30-8:45						251	69	120	71		46	26	34	284		110
8:45-9:00						278	108	143	91		55	33	38	317		127
Wednesday 7/26/06																
PM																
4:00-4:15						38	40	28	21		8	2	3	58		20
4:15-4:30						73	78	47	57		12	3	4	103		39
4:30-4:45						106	124	71	87		18	8	9	136		50
4:45-5:00						145	154	94	112		21	10	11	176		63
5:00-5:15						175	186	109	140		23	12	13	205		76
5:15-5:30						227	227	137	189		26	13	16	245		91
5:30-5:45						247	261	154	227		32	17	21	283		111
5:45-6:00						283	295	175	265		40	20	24	320		128

Intersection: Avenue 18 1/2 at Pistachio

Wednesday 7/26/06	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15						8	23	17	30		1	27	1	22		1
7:15-7:30						15	40	25	49		1	44	1	34		4
7:30-7:45						23	52	37	61		1	53	3	51		7
7:45-8:00						35	81	56	81		1	69	3	62		7
8:00-8:15						46	99	69	100		2	86	3	72		8
8:15-8:30						53	124	87	125		3	108	5	79		10
8:30-8:45						68	148	102	158		3	131	5	85		10
8:45-9:00						76	167	126	178		4	146	5	91		10
Wednesday 7/26/06																
PM																
4:00-4:15						12	21	17	21		0	14	0	9		1
4:15-4:30						20	43	32	49		1	29	0	15		1
4:30-4:45						36	61	47	80		1	42	0	38		2
4:45-5:00						55	90	72	109		1	55	1	56		2
5:00-5:15						71	112	91	123		1	64	2	69		3
5:15-5:30						95	142	117	155		3	81	5	85		5
5:30-5:45						107	157	127	179		3	100	5	103		5
5:45-6:00						122	180	147	198		5	115	5	126		6

Intersection: Avenue 18 1/2 at Golden State Blvd

HWY 41 @ RD 145

8/31/2005	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	4	48	4	6	5	18	7	6	13	218	27	6	5	17	21	4
7:15-7:30	26	97	10	11	15	30	20	10	23	434	52	10	16	32	40	11
7:30-7:45	30	160	12	12	17	48	20	10	27	620	93	13	28	45	58	11
7:45-8:00	31	183	13	15	21	50	23	10	30	727	116	14	36	50	70	13
8:00-8:15	37	225	13	20	23	54	26	15	34	830	126	15	40	56	81	17
8:15-8:30	44	306	14	27	24	62	28	16	42	1010	152	19	57	66	91	19
8:30-8:45	45	371	20	29	27	76	31	18	50	1125	169	25	77	71	104	22
8:45-9:00	56	440	25	31	32	84	33	20	50	1241	190	29	80	78	113	23
8/30/2005																
PM																
4:00-4:15	9	133	1	2	11	12	6	1	3	114	10	2	37	23	11	1
4:15-4:30	28	350	2	3	21	37	13	1	10	279	21	3	71	42	26	3
4:30-4:45	41	450	11	6	26	45	27	2	14	421	33	3	103	65	34	6
4:45-5:00	52	575	14	7	32	61	35	3	16	532	42	5	115	82	45	8
5:00-5:15	73	673	23	9	39	73	49	9	19	634	56	9	147	101	52	19
5:15-5:30	78	743	24	9	42	78	54	10	22	673	62	9	156	115	57	19
5:30-5:45	86	949	37	15	48	98	71	18	29	859	76	15	208	139	62	22
5:45-6:00	100	1208	41	24	53	111	87	21	35	1086	89	20	239	159	67	24

Intersection: HWY 41 @ RD 145

8/31/2005	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	55	13	5	32	0	8	6	9	233	0	3	0	0	0	0
7:15-7:30	0	110	22	6	63	0	13	7	21	429	0	3	0	0	0	0
7:30-7:45	0	159	26	7	78	0	17	8	32	566	0	4	0	0	0	0
7:45-8:00	0	230	36	11	103	0	24	9	41	700	0	7	0	0	0	0
8:00-8:15	0	299	49	15	131	0	34	11	56	884	0	10	0	0	0	0
8:15-8:30	0	368	55	20	152	0	43	12	61	1010	0	16	0	0	0	0
8:30-8:45	0	444	60	27	179	0	47	16	67	1137	0	21	0	0	0	0
8:45-9:00	0	525	69	31	203	0	48	18	71	1247	0	25	0	0	0	0
8/30/2005																
PM																
4:00-4:15	0	146	13	6	10	0	11	1	7	114	0	4	0	0	0	0
4:15-4:30	0	293	39	8	18	0	16	2	15	210	0	10	0	0	0	0
4:30-4:45	0	465	69	11	34	0	40	3	25	294	0	12	0	0	0	0
4:45-5:00	0	632	87	11	42	0	48	3	31	423	0	16	0	0	0	0
5:00-5:15	0	812	110	12	47	0	60	5	37	503	0	21	0	0	0	0
5:15-5:30	0	988	126	13	53	0	71	5	48	600	0	22	0	0	0	0
5:30-5:45	0	1218	150	13	66	0	76	5	52	698	0	26	0	0	0	0
5:45-6:00	0	1388	179	14	72	0	81	6	56	754	0	30	0	0	0	0

Intersection: HWY 41 @ RD 200

8/31/2005	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	1	94	2	5	9	0	5	0	1	83	0	9	0	0	0	0
7:15-7:30	1	249	4	15	12	0	18	1	2	162	0	13	0	0	0	0
7:30-7:45	2	381	5	20	29	0	20	1	8	258	2	16	1	0	2	0
7:45-8:00	2	545	6	23	37	0	28	1	14	352	2	19	2	0	2	0
8:00-8:15	2	686	10	28	46	0	35	1	23	458	2	19	2	0	2	0
8:15-8:30	2	770	13	31	49	0	38	2	26	551	3	22	2	0	2	0
8:30-8:45	2	889	14	35	55	0	44	2	32	675	3	24	3	0	2	0
8:45-9:00	2	1016	18	44	57	0	48	3	35	765	4	27	3	0	2	0
8/30/2005																
PM																
4:00-4:15	1	106	4	4	0	0	5	0	10	115	0	4	0	0	0	0
4:15-4:30	1	231	4	7	3	0	10	1	18	218	0	6	0	0	0	0
4:30-4:45	1	380	6	8	5	0	13	2	27	383	0	10	0	0	0	0
4:45-5:00	1	527	7	9	7	0	23	2	35	515	0	11	0	0	0	0
5:00-5:15	1	650	13	11	10	0	25	2	41	658	1	12	0	0	0	0
5:15-5:30	1	804	17	15	12	0	27	2	47	802	1	15	0	0	0	0
5:30-5:45	1	930	20	16	14	0	32	2	57	948	2	20	0	0	1	0
5:45-6:00	1	1034	29	17	15	0	35	2	65	1068	2	22	1	0	1	0

Intersection: HWY 41 @ RD 420

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	40	133	0	7	0	0	0	0	0	136	115	6	151	0	29	9
7:15-7:30	55	89	0	2	0	0	0	0	0	95	91	6	143	1	32	5
7:30-7:45	24	83	1	4	0	0	0	0	0	122	107	9	140	0	15	4
7:45-8:00	65	129	2	1	0	0	0	0	0	117	133	5	147	0	31	3
8:00-8:15	55	133	0	2	0	0	0	0	0	110	157	8	176	0	55	6
8:15-8:30	52	140	0	2	0	0	0	0	0	126	98	2	161	0	32	4
8:30-8:45	48	137	0	4	0	0	0	0	0	109	107	1	153	0	33	2
8:45-9:00	35	99	0	2	0	0	0	0	0	121	80	4	123	0	34	2
PM																
4:00-4:15	13	78	0	4	0	0	0	0	0	76	48	4	70	0	31	9
4:15-4:30	22	133	0	12	0	0	0	0	0	73	57	6	146	0	31	9
4:30-4:45	23	164	0	7	0	0	1	0	0	96	85	7	141	12	16	9
4:45-5:00	31	135	0	6	2	0	0	0	0	113	116	7	141	0	27	8
5:00-5:15	43	90	0	5	0	0	0	0	0	106	83	13	87	3	25	8
5:15-5:30	20	77	0	4	1	0	2	0	0	76	78	8	99	0	17	6
5:30-5:45	23	102	0	5	0	0	0	0	0	90	65	6	100	0	20	5
5:45-6:00	22	89	0	4	0	0	0	0	0	45	57	3	64	0	24	2

Intersection: HWY 41 @ HWY 49

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR
AM															
7:00-7:15	1	0	0	1	0	7	5	0	1	1	9	0	0	7	5
7:15-7:30	4	1	1	2	1	13	5	1	1	0	7	0	1	13	5
7:30-7:45	1	1	0	0	3	19	13	0	1	2	2	0	3	19	13
7:45-8:00	5	4	0	0	5	7	6	0	1	3	10	1	5	7	6
8:00-8:15	21	2	3	0	14	10	5	2	0	4	6	0	14	10	5
8:15-8:30	17	9	12	0	11	14	6	0	1	5	1	0	11	14	6
8:30-8:45	14	3	4	0	3	10	3	0	0	0	1	0	3	10	3
8:45-9:00	4	2	3	1	3	12	2	0	1	0	14	1	3	12	2
PM															
4:00-4:15	19	0	8	0	2	9	4	0	3	1	15	1	9	25	8
4:15-4:30	5	0	11	0	2	6	3	0	5	1	12	0	8	17	11
4:30-4:45	15	3	18	0	3	14	7	1	5	3	15	0	8	18	18
4:45-5:00	7	1	7	0	0	11	5	0	11	1	16	0	7	18	7
5:00-5:15	3	1	8	0	3	9	3	0	4	0	6	0	8	16	8
5:15-5:30	2	0	7	0	3	12	2	0	6	0	11	0	9	18	7
5:30-5:45	4	1	6	1	2	13	1	0	2	1	7	1	5	15	6
5:45-6:00	11	0	14	1	3	9	0	0	5	1	8	0	7	20	14

Intersection: RD 225 @ RD 274

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	7	0	0	0	0	4	0	3	5	0	1	0	0	0	0
7:15-7:30	0	7	0	0	0	0	6	1	4	1	0	1	0	0	0	0
7:30-7:45	0	15	0	0	1	0	11	1	3	2	0	0	0	0	0	0
7:45-8:00	0	11	1	0	0	0	6	0	3	0	0	0	0	0	0	0
8:00-8:15	0	15	0	1	0	0	8	0	4	2	0	0	0	0	0	0
8:15-8:30	0	15	0	0	0	0	7	0	2	2	0	0	0	0	0	0
8:30-8:45	0	9	0	0	0	0	3	0	8	2	0	0	0	0	0	0
8:45-9:00	0	6	1	0	0	0	7	0	1	2	0	0	0	0	0	0
PM																
4:00-4:15	0	7	0	0	0	0	3	0	5	15	0	1	0	0	0	0
4:15-4:30	0	2	1	1	1	0	0	0	6	13	0	0	0	0	0	0
4:30-4:45	0	11	0	0	0	0	4	2	3	12	0	0	0	0	0	0
4:45-5:00	0	5	0	0	0	0	5	0	7	11	0	1	0	0	0	0
5:00-5:15	0	3	0	0	1	0	6	0	7	13	0	1	0	0	0	0
5:15-5:30	0	5	0	0	0	0	8	0	10	9	1	0	0	0	0	0
5:30-5:45	0	5	0	0	0	0	3	0	4	9	0	2	0	0	0	0
5:45-6:00	0	5	0	0	0	0	4	0	7	14	1	0	0	0	0	0

Intersection: RD 225 @ CASCADEL RD

4/14/2005	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM								0								
7:00-7:15	0		0	0	0	5		0						0	2	1
7:15-7:30	2		0	0	0	1		0						3	0	1
7:30-7:45	0		0	0	0	12		1						2	2	0
7:45-8:00	3		0	0	0	5		0						2	3	0
8:00-8:15	1		0	0	0	4		0						3	1	0
8:15-8:30	2		0	0	0	6		0						3	1	0
8:30-8:45	0		0	0	0	3		0						2	2	0
8:45-9:00	5		0	0	0	1		0						3	1	0
PM																
4:00-4:15	1		1	1	0	7		0						4	3	1
4:15-4:30	0		0	0	0	2		0						5	0	1
4:30-4:45	0		0	0	0	4		2						3	0	0
4:45-5:00	0		0	0	0	2		0						4	0	0
5:00-5:15	0		0	0	0	8		0						9	1	1
5:15-5:30	1		0	0	0	3		0						2	1	0
5:30-5:45	2		0	0	0	7		0						10	0	0
5:45-6:00	0		0	0	0	2		0						5	2	1

Intersection: Cascadel Rd. at Mission Dr.

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	11	2	1	2	0	1	0	3	22	0	0	0	0	0	0
7:15-7:30	1	17	6	1	4	0	3	0	2	17	1	4	1	0	1	0
7:30-7:45	0	15	0	1	1	1	7	1	5	14	0	0	0	0	1	0
7:45-8:00	1	34	6	1	1	0	9	0	2	8	0	1	0	0	0	0
8:00-8:15	0	33	1	3	1	0	4	0	2	20	1	0	0	0	0	0
8:15-8:30	1	40	2	0	1	0	3	0	5	34	1	3	0	0	1	0
8:30-8:45	1	17	2	3	2	0	1	0	5	16	3	1	0	0	0	0
8:45-9:00	0	19	0	0	1	0	6	3	2	20	0	0	1	0	0	0
PM																
4:00-4:15	0	16	2	1	4	0	6	0	10	20	2	1	2	0	1	0
4:15-4:30	2	27	5	0	3	0	2	0	6	17	1	1	0	0	0	0
4:30-4:45	0	26	2	5	2	0	5	0	6	41	1	0	0	0	3	0
4:45-5:00	1	20	2	0	3	0	4	1	7	26	1	1	1	0	1	0
5:00-5:15	0	20	1	0	6	0	6	0	5	33	0	1	2	0	1	0
5:15-5:30	0	14	1	0	3	0	6	0	3	14	0	0	0	0	0	0
5:30-5:45	0	19	2	0	3	0	5	0	2	16	0	0	0	0	0	0
5:45-6:00	0	22	0	0	3	0	3	1	1	16	0	0	0	0	0	0

Intersection: NORTH FORK RD @ AUBERRY RD

7/28/2004	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	0	0	0	0	26	1	0	2	0	20	2	3	14	0	0
7:15-7:30	0	0	0	0	0	19	6	2	9	0	10	0	5	14	0	0
7:30-7:45	0	0	0	0	0	18	6	0	1	0	17	0	2	16	0	1
7:45-8:00	0	0	0	0	0	10	0	1	6	0	5	2	4	21	0	0
8:00-8:15	0	0	0	0	0	14	4	0	9	0	4	0	2	17	0	0
8:15-8:30	0	0	0	0	0	26	7	0	4	0	11	0	2	22	0	0
8:30-8:45	0	0	0	0	0	16	2	1	4	0	7	0	1	13	0	1
8:45-9:00	0	0	0	0	0	18	3	0	0	0	9	0	5	12	0	0
PM																
4:00-4:15	0	0	0	0	0	13	8	0	3	0	5	0	9	19	0	0
4:15-4:30	0	0	0	0	0	13	3	1	6	0	9	0	8	30	0	2
4:30-4:45	0	0	0	0	0	26	5	0	4	0	5	0	12	28	0	0
4:45-5:00	0	0	0	0	0	28	6	2	4	0	1	0	12	17	0	0
5:00-5:15	0	0	0	0	0	27	4	0	4	0	3	0	8	25	0	0
5:15-5:30	0	0	0	0	0	16	2	0	4	1	2	0	12	22	0	0
5:30-5:45	0	0	0	0	0	12	2	0	4	0	8	0	8	19	0	0
5:45-6:00	0	0	0	0	0	16	2	0	2	0	7	0	15	24	0	0

Intersection: CRANE VALLEY RD @ NORTH FORK RD

ATTACHMENT VI – C - 54

MADERA COUNTY CAPACITY TABLE

Table 9
Capacity Class and Capacity per Hour per Lane

	Madera County		Fresno County		Merced County	
Facility Type	CAPCLA SS	Capacity	CAPCLA SS	Capacity	CAPCLA SS	Capacity
Freeway	1	2,000	19,59	2,000	1	2,000
Highway	2	1,145[1]/1,800[2]			2	1,145[1]/1,800[2]
County Road	3	900[1]/1,400[2]			3	900[1]/1,400[2]
Expressway	8	1,200	18,58	1,000/1,200		
Arterial	4	750			4	750
Undivided Arterial with Parking			13,53	700/800		
Undivided Arterial without Parking			14,54	800/900		
Divided Arterial with Parking			15,55	800/900		
Divided Arterial without Parking			16,56	900		
Collector	5	500	12,52	600,700	5	500
Local	6	350			6	350
Freeway Ramp	7	1,500			7	1,500
Centroid ~~Collector~~ Connector	10	10,000	10,50	0	10	10,000

Notes: 1: Capacity per hour per lane for two-lane rural highways
2: Capacity per hour per lane for multi-lane rural highways

- *Adjusted Volume = Unadjusted Volume + Observed 1990 Volume - Calibrated Model 1990 Volume*

If there is no observed volume for a segment, the adjusted volume is set equal to the unadjusted volume. The volume/capacity ratio produced by the highway assignment is also adjusted to reflect the adjusted volume.

The service level computation is based on relationships derived from the 1985 Highway Capacity manual. Chapters 3, 7 and 8 of the Manual, which are largely oriented towards design, include a large number of factors that are more complex than can be used for planning purposes. However, average design defaults have been developed and used as the per/lane capacity basis in the capacity constrained assignment process. These capacities are shown as the Level E capacities in Table 13 below as well as in Table 9. The HCM also contains cut-off levels for Service Levels A through D. These capacities are also shown in Table 13. Table 14 indicates the resultant volume/capacity ratios for Service Levels A through D for the basic types of roadways in Madera County using Level E as the basic roadway capacity; in this table, the V/C ratios for urban streets are derived from the planning portion of the intersection LOS process. The postprocessor that follows the assignment module uses these V/C ratios to determine the Level of Service on each link.

Table 13
Capacities per Hour per Lane for Various Highway Facilities

LOS	Freeways	Two-Lane Rural Highways	Multi-lane Rural Highways
A	700	120	471
B	1100	240	943
C	1550	395	1286
D	1850	675	1586
E	2000	1145	1800

Table 14
Volume/Capacity Ratios Various Highway Facilities

LOS	Freeways	Two-Lane Rural Highways	Multi-lane Rural Highways	Urban Streets
A	0.35	0.10	0.26	0.60
B	0.55	0.21	0.52	0.70
C	0.78	0.34	0.71	0.80
D	0.93	0.59	0.88	0.90
E	1.00	1.00	1.00	1.00

The file produced by the postprocessor module thus contains all of the original network characteristics together with the unadjusted and adjusted volume, the adjusted volume/capacity ratio and the computed level of service.