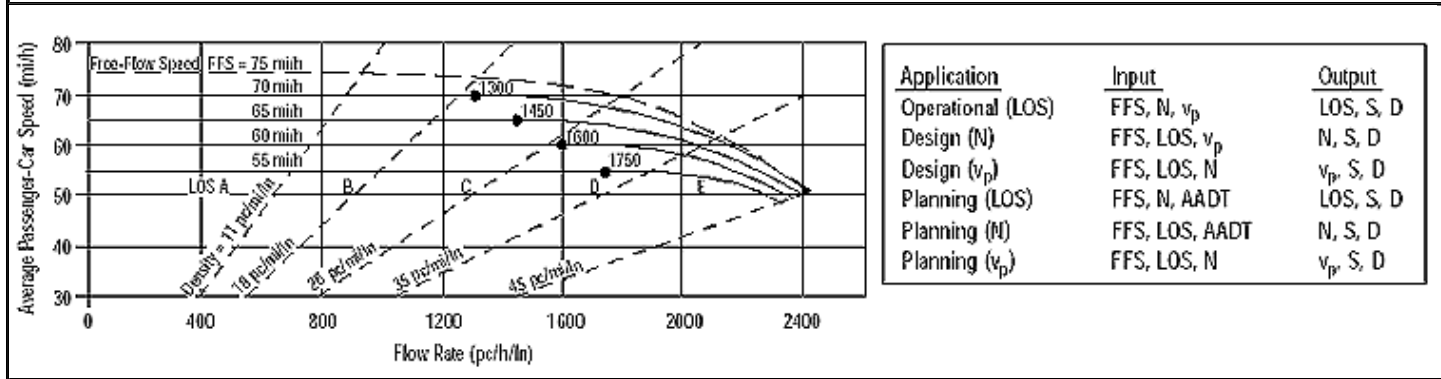


APPENDIX L

2030 WITHOUT DOMINGUEZ ROAD (WITHOUT AND PLUS PROJECT)

FREEWAY SEGMENTS – HCS PLUS ANALYSIS

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Atlantic St/Taylor Rd
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs

Volume, V	7736	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade %	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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

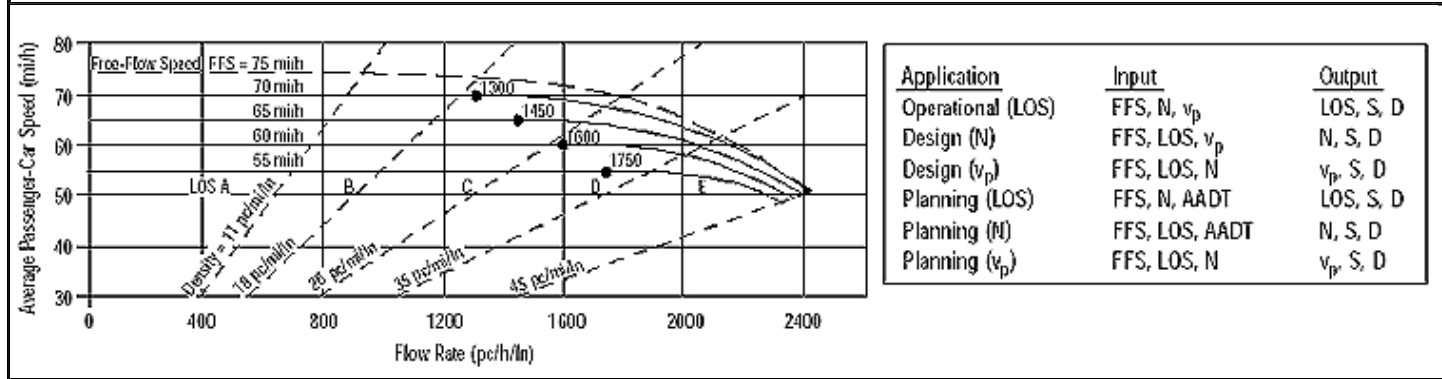
LOS and Performance Measures **Design (N)**

Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1771	Design LOS	
S	68.2	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	26.0	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 - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Atlantic St/Taylor Rd
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs

Volume, V	7235	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

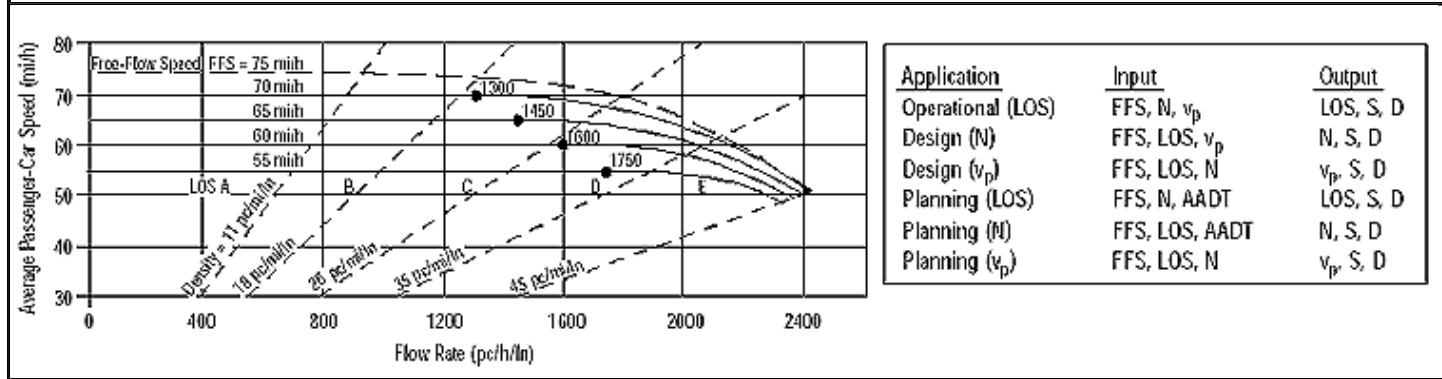
LOS and Performance Measures **Design (N)**

Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1656	Design LOS	
	pc/h/ln	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
S	69.1		mi/h
D = v _p / S	24.0	D = v _p / S	pc/mi/ln
LOS	C	Required Number of Lanes, N	

Glossary **Factor Location**

N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Atlantic St/Taylor Rd
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs

Volume, V	6367	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P_T	6
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
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	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.971

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	l/mi	f_{ID}	mi/h
Number of Lanes, N	5		f_N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

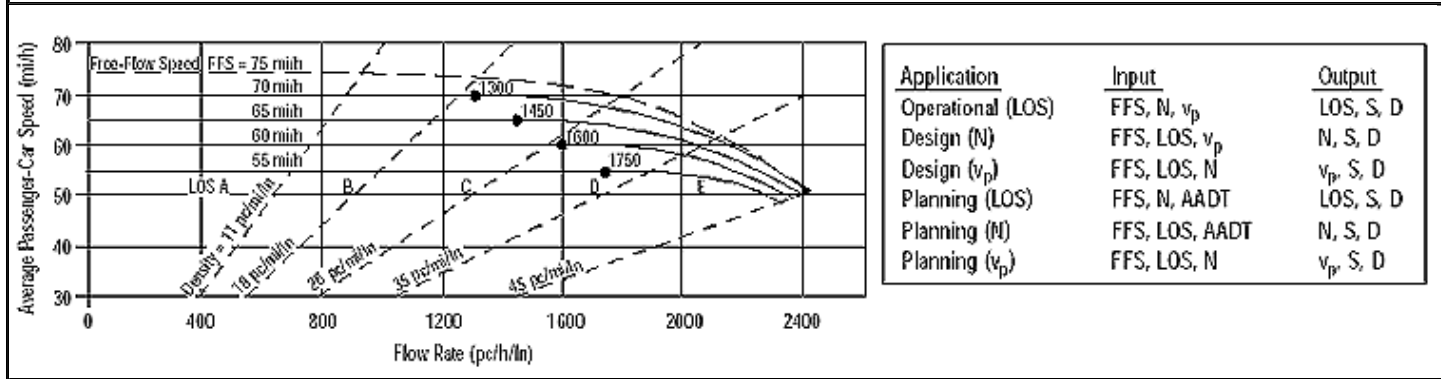
LOS and Performance Measures **Design (N)**

Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1457	Design LOS	
S	69.9	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	20.8	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 - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst <i>Arthur Black</i>	Highway/Direction of Travel <i>I-80 WB</i>
Agency or Company <i>LSA</i>	From/To <i>Atlantic St/Taylor Rd</i>
Date Performed <i>8/18/2010</i>	Jurisdiction <i>Rocklin</i>
Analysis Time Period	Analysis Year

Project Description *2030 Without Project WO - PM*

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

Flow Inputs

Volume, V	<i>8193</i>	veh/h	Peak-Hour Factor, PHF	<i>0.90</i>
AADT		veh/day	%Trucks and Buses, P_T	<i>6</i>
Peak-Hr Prop. of AADT, K			%RVs, P_R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
Driver type adjustment	<i>1.00</i>		Up/Down %	

Calculate Flow Adjustments

f_p	<i>1.00</i>	E_R	<i>1.2</i>
E_T	<i>1.5</i>	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	<i>0.971</i>

Speed Inputs **Calc Speed Adj and FFS**

Lane Width	<i>12.0</i>	ft	f_{LW}	mi/h
Rt-Shoulder Lat. Clearance	<i>6.0</i>	ft	f_{LC}	mi/h
Interchange Density	<i>0.50</i>	l/mi	f_{ID}	mi/h
Number of Lanes, N	<i>5</i>		f_N	mi/h
FFS (measured)	<i>70.0</i>	mi/h	FFS	<i>70.0</i> mi/h
Base free-flow Speed, BFFS		mi/h		

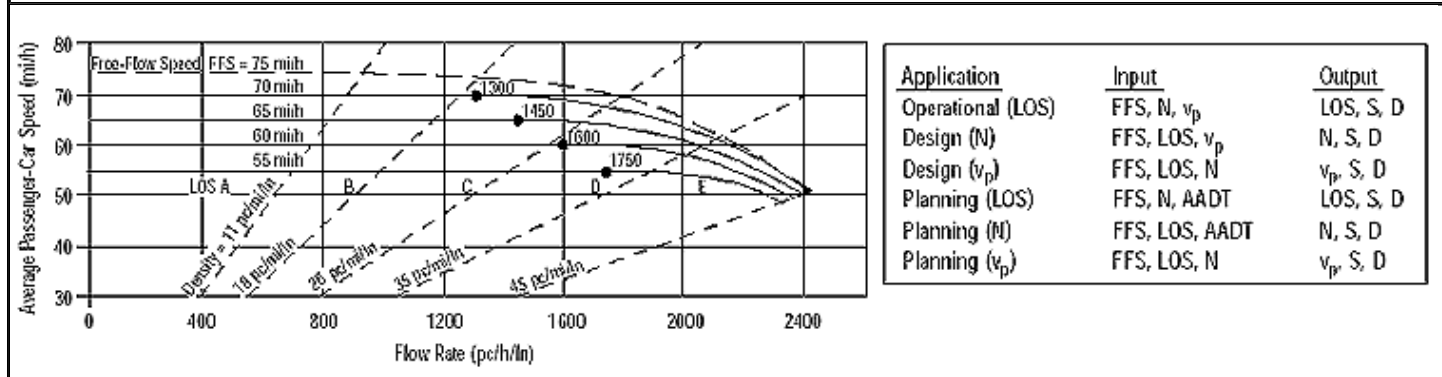
LOS and Performance Measures **Design (N)**

Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	<i>1875</i> pc/h/ln	Design LOS	
S	<i>66.9</i> mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	<i>28.0</i> pc/mi/ln	S	mi/h
LOS	<i>D</i>	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary **Factor Location**

N - Number of lanes	S - Speed	E_R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information		Site Information	
Analyst	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 Without Project WO - AM			

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

Flow Inputs			
Volume, V	6385	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

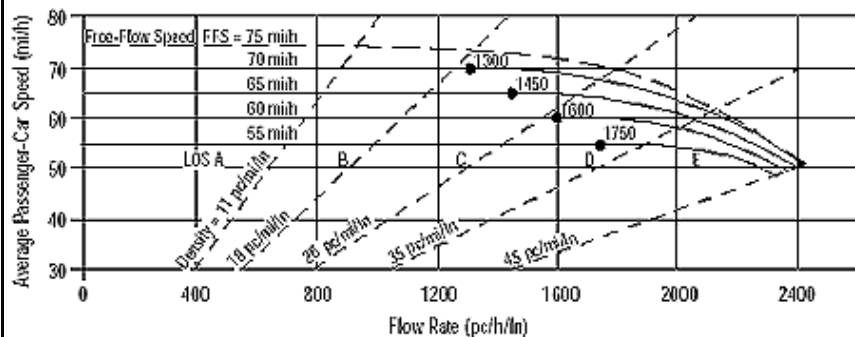
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/mi	f _{ID}	mi/h
Number of Lanes, N	5	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)	1461 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	20.9 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs

Volume, V	4886	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade %	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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures

Design (N)

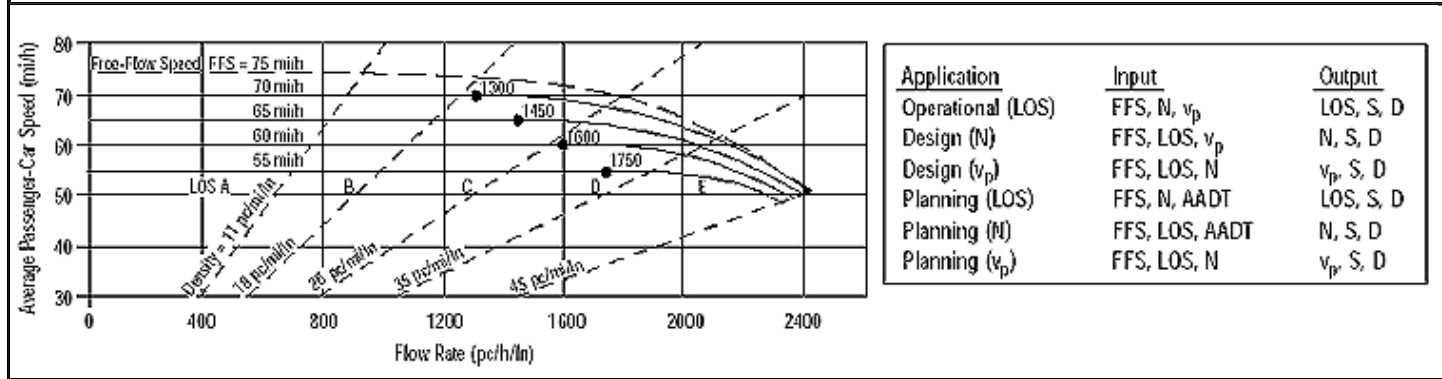
Operational (LOS)			Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1118	pc/h/ln	Design LOS	
S	70.0	mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	16.0	pc/mi/ln	S	mi/h
LOS	B		D = v _p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary

Factor Location

N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs

Volume, V	5128	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

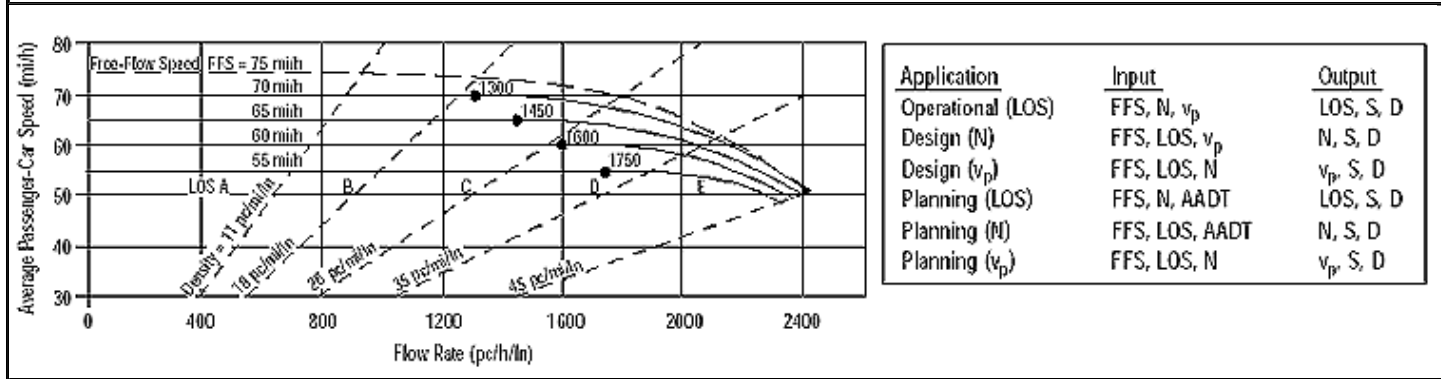
LOS and Performance Measures **Design (N)**

Operational (LOS)			Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1174	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	16.8	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 - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs

Volume, V	6697	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

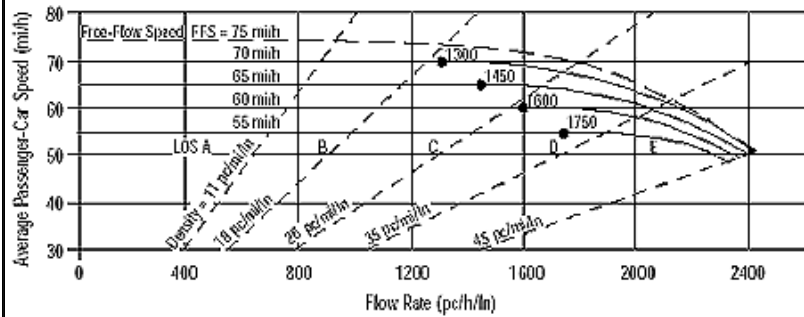
LOS and Performance Measures **Design (N)**

Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1533	Design LOS	
S	69.7	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	22.0	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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs			
Volume, V	4856	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

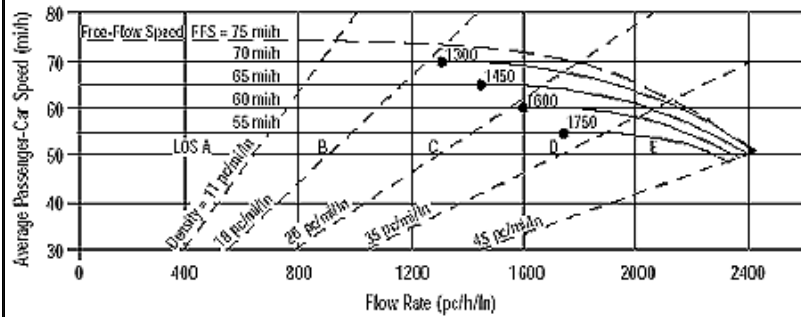
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1852 pc/h/ln	Design LOS	
S	67.2 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	27.5 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 - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information		Site Information	
Analyst	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

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<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	5331	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P_T
Peak-Hr Prop. of AADT, K			%RVs, P_R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

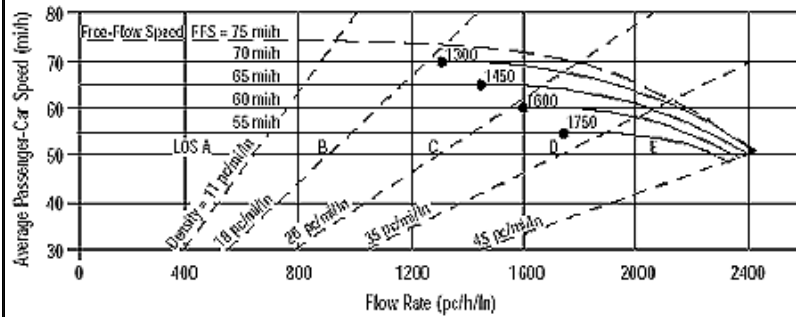
Calculate Flow Adjustments			
f_p	1.00		E_R
E_T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$

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 l/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			

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2034 pc/h/ln	Design LOS	
S	64.2 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	31.7 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

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

Flow Inputs			
Volume, V	5154	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

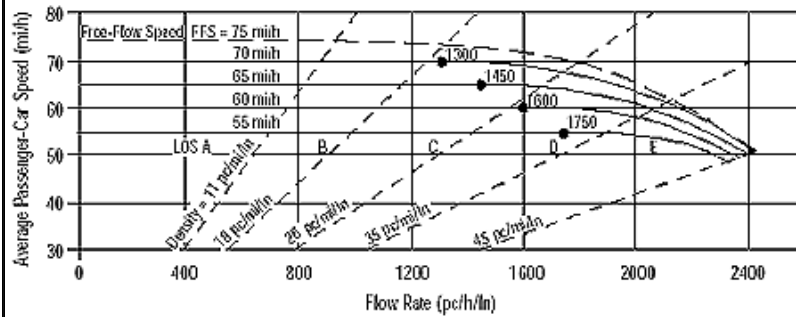
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1966 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	30.0 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

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

Flow Inputs			
Volume, V	5951	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

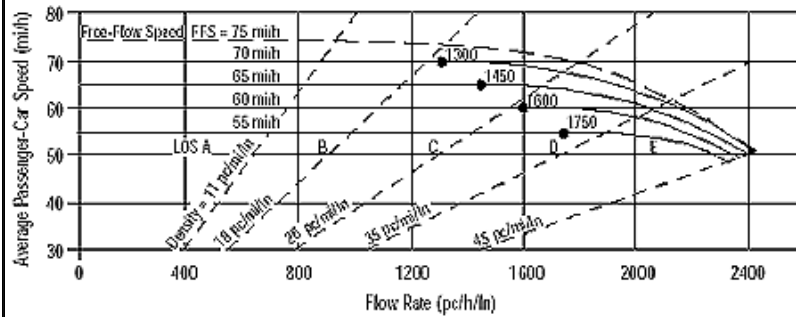
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.971

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 l/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			

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	2270 pc/h/ln	Design LOS	
S	58.0 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	39.2 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

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

Flow Inputs			
Volume, V	4506	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

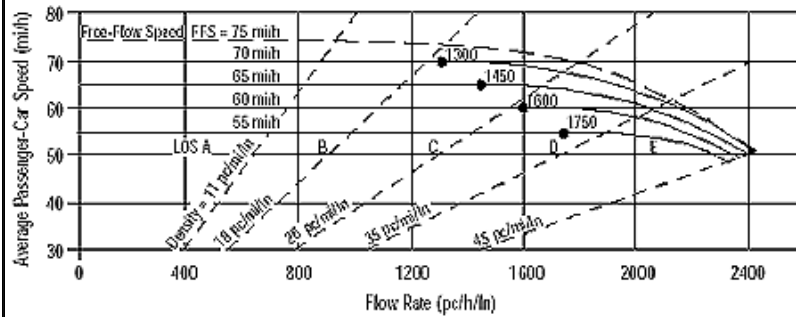
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.971

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 l/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)	1719 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	25.0 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

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

Flow Inputs			
Volume, V	5414	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

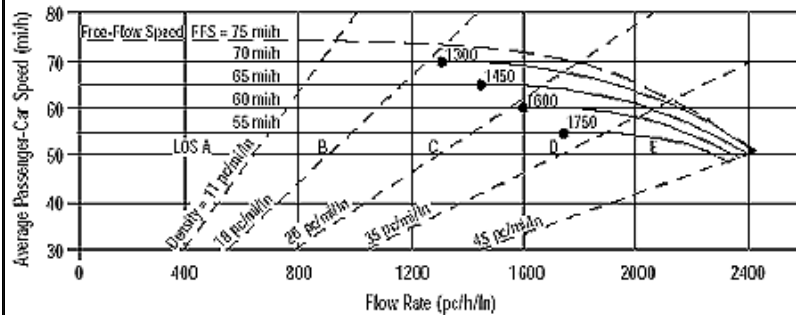
Calculate Flow Adjustments			
f _p	1.00		E _R
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]

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 l/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			

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	2065 pc/h/ln	Design LOS	
S	63.5 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	32.5 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

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

Flow Inputs			
Volume, V	5238	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

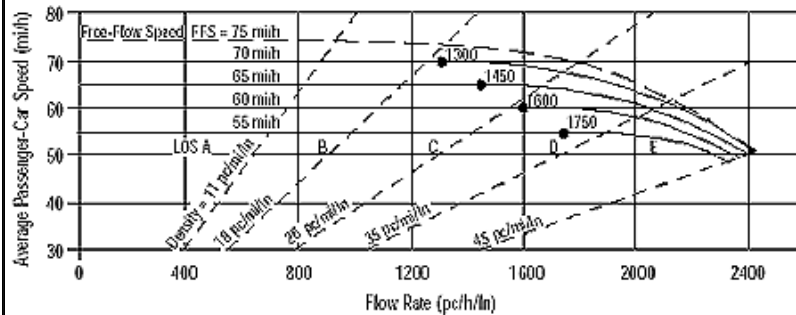
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1998 pc/h/ln	Design LOS	
S	64.9 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	30.8 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs			
Volume, V	5662	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

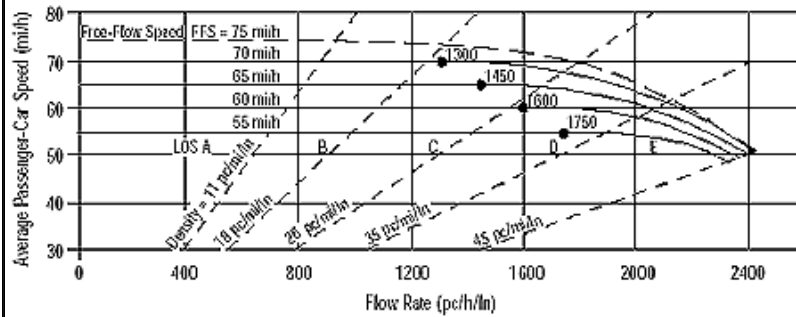
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	2160 pc/h/ln	Design LOS	
S	61.2 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	35.3 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs			
Volume, V	3477	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

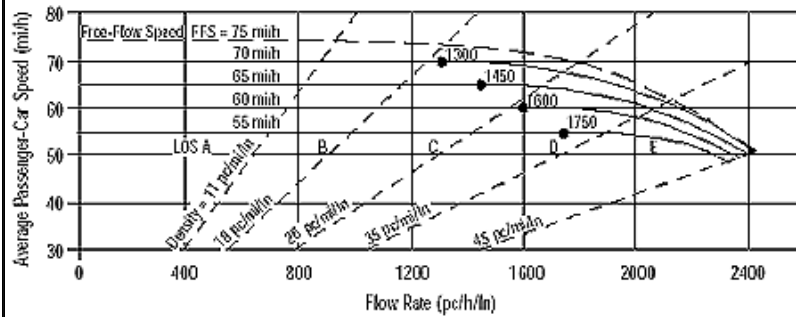
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1326 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	18.9 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs			
Volume, V	5409	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

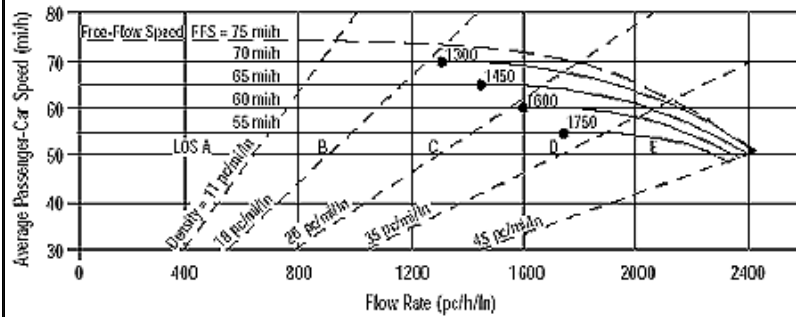
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	2063 pc/h/ln	Design LOS	
S	63.6 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	32.5 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs			
Volume, V	5034	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

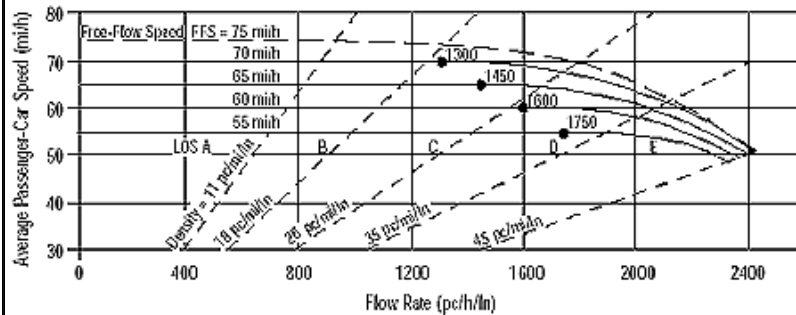
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1920 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	29.0 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs			
Volume, V	4791	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

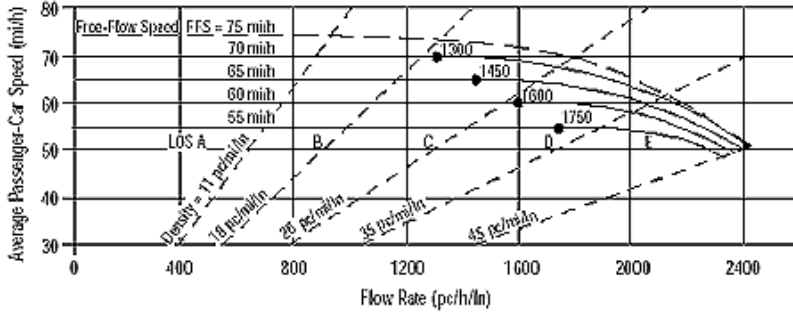
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1828 pc/h/ln	Design LOS	
S	67.5 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	27.1 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 - Exhibits 23-8, 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			

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 *Arthur Black*
 Agency or Company *LSA*
 Date Performed *6/1/2010*
 Analysis Time Period

Site Information

Highway/Direction of Travel *Rte-65 NB*
 From/To *I-80 to Harding Blvd*
 Jurisdiction *Rocklin*
 Analysis Year

Project Description *2030 Without Project WO - AM*

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

Flow Inputs

Volume, V	<i>6356</i>	veh/h	Peak-Hour Factor, PHF	<i>0.90</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>15</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
Driver type adjustment	<i>1.00</i>		Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.930</i>

Speed Inputs

Lane Width	<i>12.0</i>	ft
Rt-Shoulder Lat. Clearance	<i>6.0</i>	ft
Interchange Density	<i>0.50</i>	l/mi
Number of Lanes, N	<i>3</i>	
FFS (measured)	<i>70.0</i>	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	<i>70.0</i>	mi/h

LOS and Performance Measures

Operational (LOS)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	<i>2531</i> pc/h/ln
S	mi/h
D = v _p / S	pc/mi/ln
LOS	<i>F</i>

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	

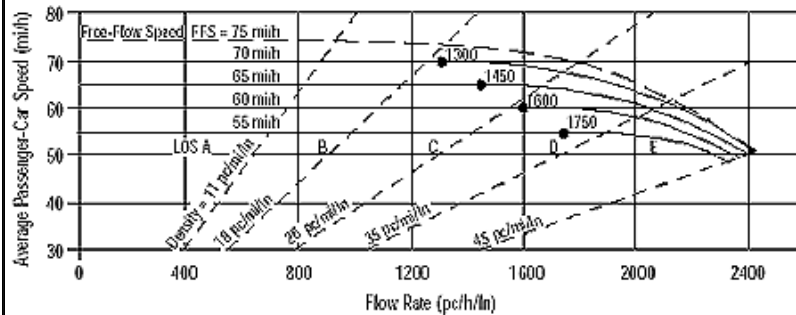
Glossary

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 - Exhibits 23-8, 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

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 *Arthur Black*
 Agency or Company *LSA*
 Date Performed *6/1/2010*
 Analysis Time Period

Site Information

Highway/Direction of Travel *Rte-65 NB*
 From/To *I-80 to Harding Blvd*
 Jurisdiction *Rocklin*
 Analysis Year

Project Description *2030 Without Project WO - PM*

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

Flow Inputs

Volume, V	<i>6127</i>	veh/h	Peak-Hour Factor, PHF	<i>0.90</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>15</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
Driver type adjustment	<i>1.00</i>		Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.930</i>

Speed Inputs

Lane Width	<i>12.0</i>	ft
Rt-Shoulder Lat. Clearance	<i>6.0</i>	ft
Interchange Density	<i>0.50</i>	l/mi
Number of Lanes, N	<i>3</i>	
FFS (measured)	<i>70.0</i>	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	<i>70.0</i>	mi/h

LOS and Performance Measures

Operational (LOS)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	<i>2439</i> pc/h/ln
S	mi/h
D = v _p / S	pc/mi/ln
LOS	<i>F</i>

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	

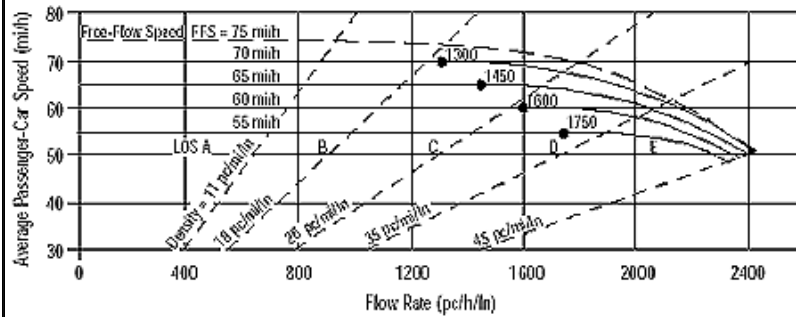
Glossary

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 - Exhibits 23-8, 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

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	I-80 to Harding Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs			
Volume, V	4739	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

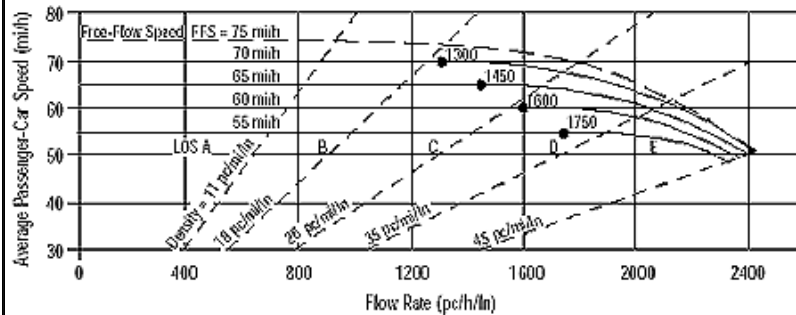
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	1887 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 - Exhibits 23-8, 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			

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 *Arthur Black*
 Agency or Company *LSA*
 Date Performed *6/1/2010*
 Analysis Time Period

Site Information

Highway/Direction of Travel *Rte-65 SB*
 From/To *I-80 to Harding Blvd*
 Jurisdiction *Rocklin*
 Analysis Year

Project Description *2030 Without Project WO - PM*

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

Flow Inputs

Volume, V	<i>5661</i>	veh/h	Peak-Hour Factor, PHF	<i>0.90</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>15</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
Driver type adjustment	<i>1.00</i>		Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.930</i>

Speed Inputs

Lane Width	<i>12.0</i>	ft
Rt-Shoulder Lat. Clearance	<i>6.0</i>	ft
Interchange Density	<i>0.50</i>	l/mi
Number of Lanes, N	<i>3</i>	
FFS (measured)	<i>70.0</i>	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	<i>70.0</i>	mi/h

LOS and Performance Measures

Operational (LOS)		
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	<i>2254</i>	pc/h/ln
S	<i>58.5</i>	mi/h
D = v _p / S	<i>38.5</i>	pc/mi/ln
LOS	<i>E</i>	

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		

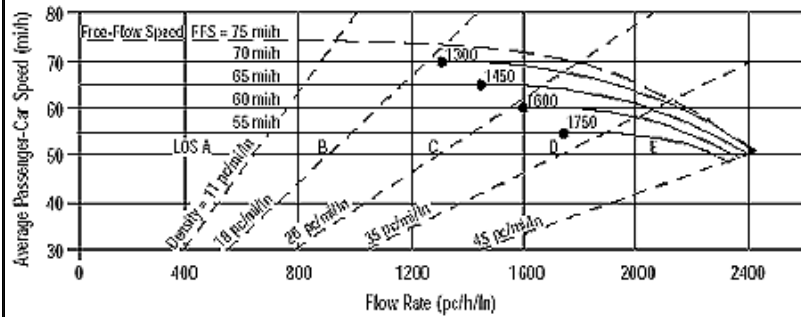
Glossary

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 - Exhibits 23-8, 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

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Harding Blvd/Pleasant Grove
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs			
Volume, V	5541	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

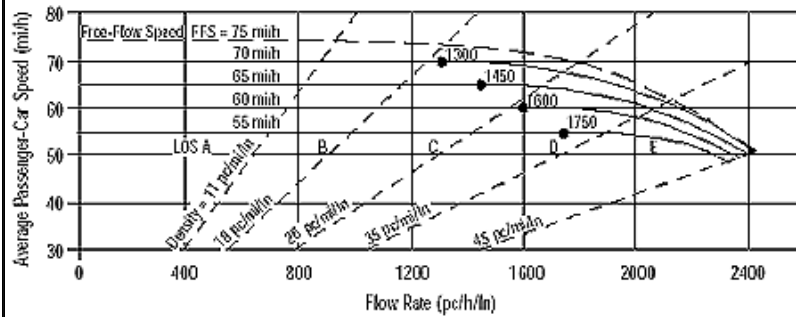
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.930

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 l/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)	2206 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	
N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Harding Blvd/Pleasant Grove
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs			
Volume, V	5681	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

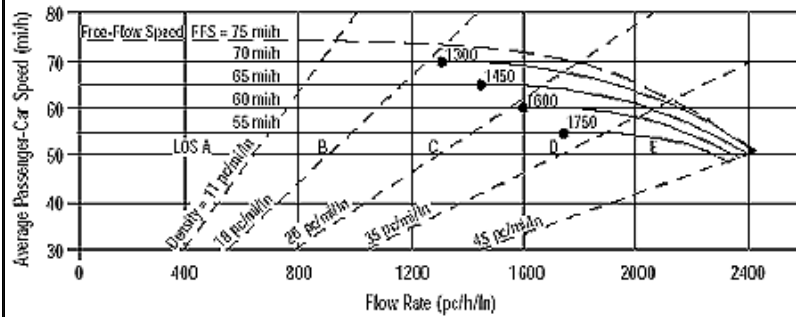
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	2262 pc/h/ln	Design LOS	
S	58.2 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	38.8 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 - Exhibits 23-8, 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			

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 *Arthur Black*
 Agency or Company *LSA*
 Date Performed *6/1/2010*
 Analysis Time Period

Site Information

Highway/Direction of Travel *Rte-65 SB*
 From/To *Harding Blvd/Pleasant Grove*
 Jurisdiction *Rocklin*
 Analysis Year

Project Description *2030 Without Project WO - AM*

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

Flow Inputs

Volume, V	<i>4842</i>	veh/h	Peak-Hour Factor, PHF	<i>0.90</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>15</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
Driver type adjustment	<i>1.00</i>		Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.930</i>

Speed Inputs

Lane Width	<i>12.0</i>	ft
Rt-Shoulder Lat. Clearance	<i>6.0</i>	ft
Interchange Density	<i>0.50</i>	l/mi
Number of Lanes, N	<i>3</i>	
FFS (measured)	<i>70.0</i>	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	<i>70.0</i>	mi/h

LOS and Performance Measures

Operational (LOS)		
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	<i>1928</i>	pc/h/ln
S	<i>66.1</i>	mi/h
D = v _p / S	<i>29.2</i>	pc/mi/ln
LOS	<i>D</i>	

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		

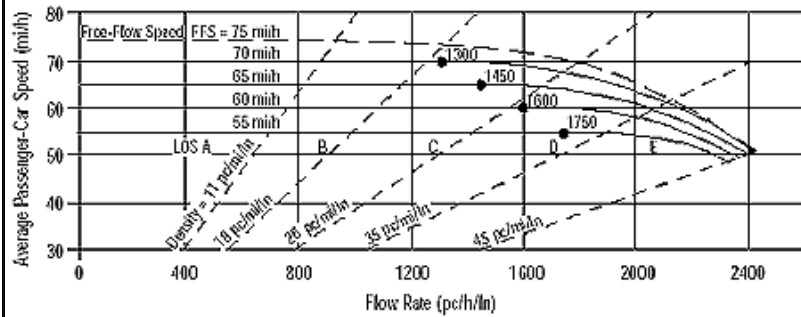
Glossary

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 - Exhibits 23-8, 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

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	Harding Blvd/Pleasant Grove
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs			
Volume, V	5384	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

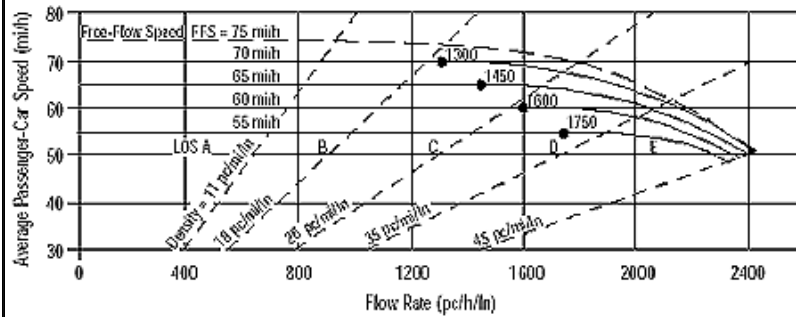
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.930

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 l/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)	2144 pc/h/ln	Design LOS	
S	61.6 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	34.8 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs			
Volume, V	4642	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

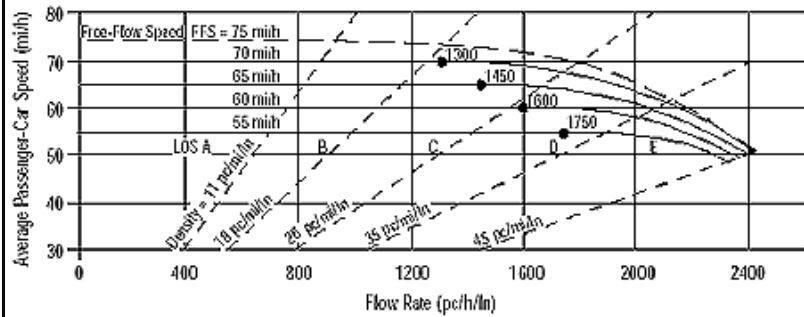
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.930

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 l/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			

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1848 pc/h/ln	Design LOS	
S	67.3 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	27.5 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	5258	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

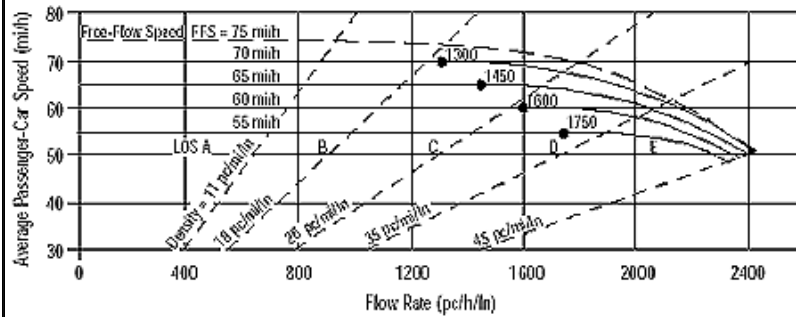
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	2093 pc/h/ln	Design LOS	
S	62.9 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	33.3 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - AM

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

Flow Inputs			
Volume, V	4419	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

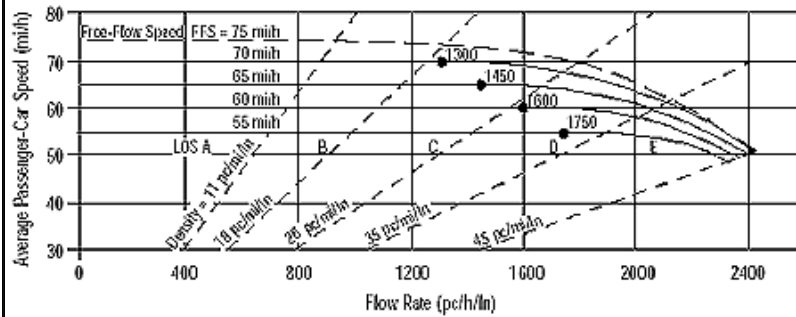
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	1759 pc/h/ln	Design LOS	
S	68.3 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	25.8 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 Without Project WO - PM

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

Flow Inputs			
Volume, V	4458	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

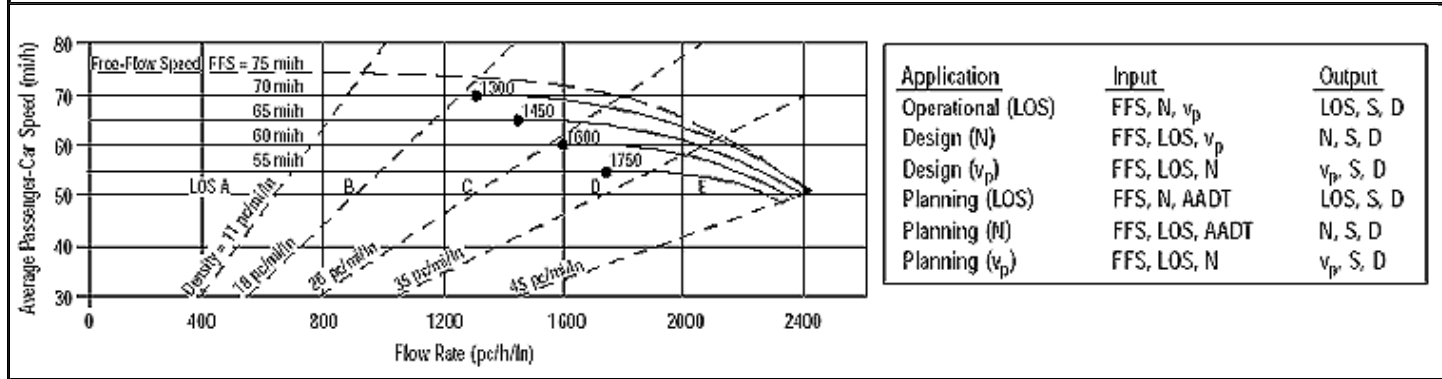
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.930

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 l/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)	1775 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	
N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information		Site Information	
Analyst	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Atlantic St/Taylor Rd
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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

Flow Inputs			
Volume, V	7766	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

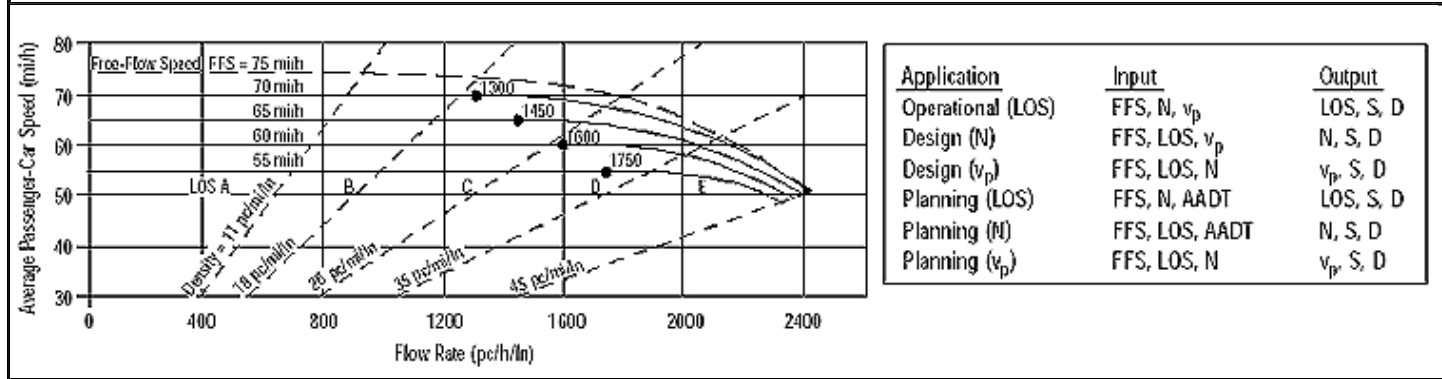
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/mi	f _{ID}	mi/h
Number of Lanes, N	5	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)	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	
N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Atlantic St/Taylor Rd
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - PM

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

Flow Inputs

Volume, V	7330	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

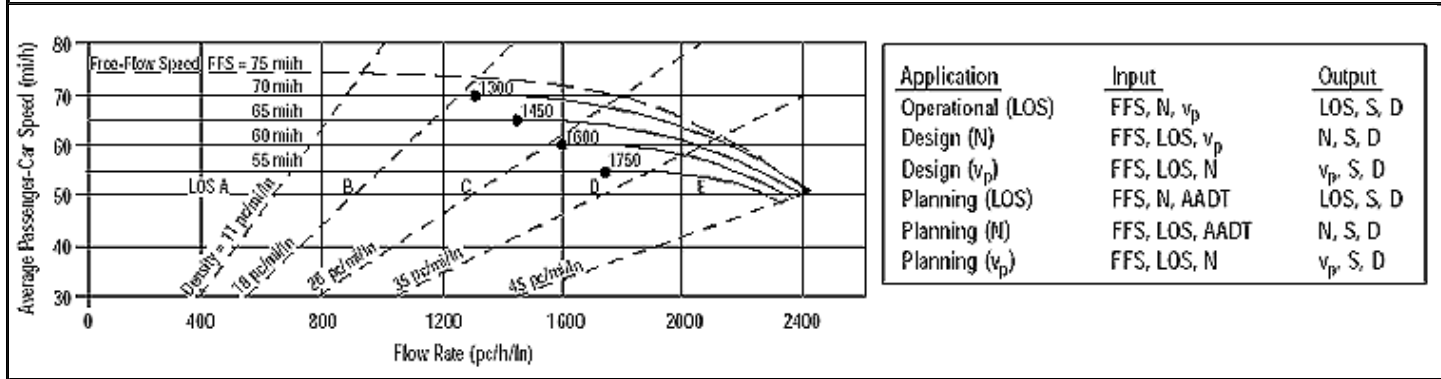
LOS and Performance Measures **Design (N)**

Operational (LOS)			Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1678	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**

N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Atlantic St/Taylor Rd
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - AM

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

Flow Inputs

Volume, V	6407	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

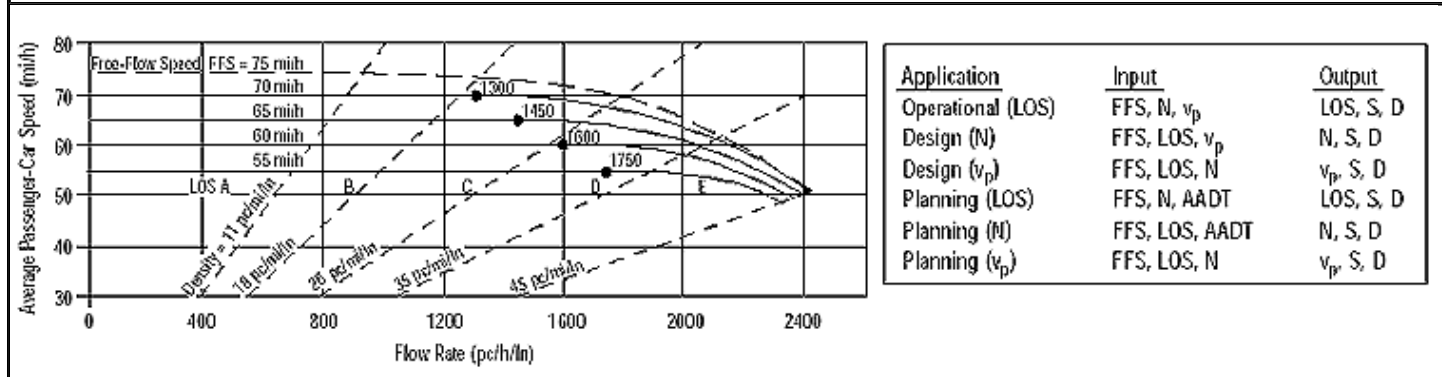
LOS and Performance Measures **Design (N)**

Operational (LOS)			Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1466	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	21.0	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 - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Atlantic St/Taylor Rd
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - PM

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

Flow Inputs

Volume, V	8283	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

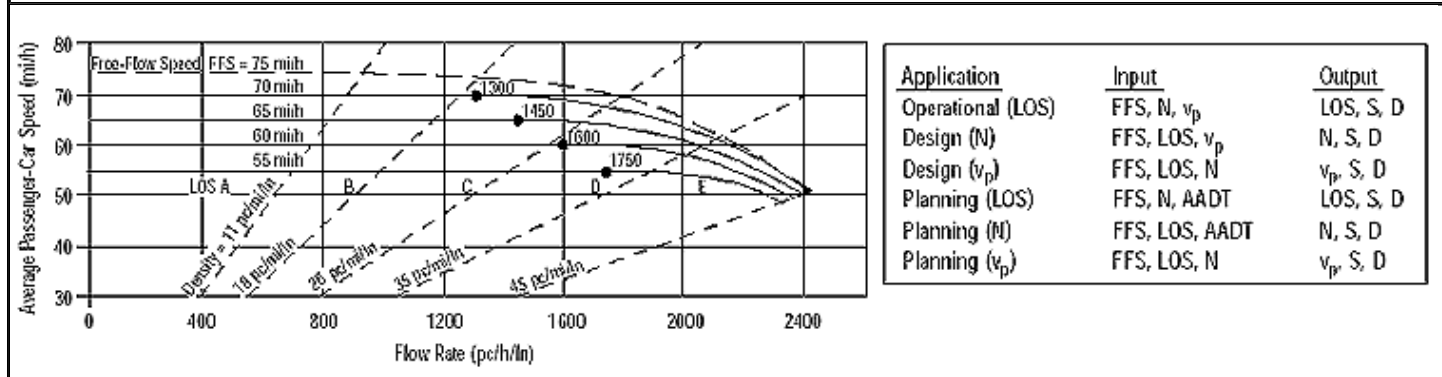
LOS and Performance Measures **Design (N)**

Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1896	Design LOS	
S	66.6	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	28.5	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 - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information		Site Information	
Analyst	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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

Flow Inputs			
Volume, V	6430	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

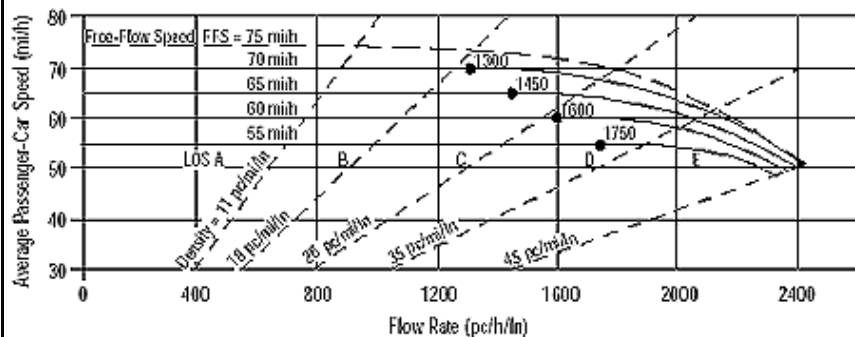
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/mi	f _{ID}	mi/h
Number of Lanes, N	5	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)	1472 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	21.1 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - PM

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

Flow Inputs

Volume, V	5029	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures

Design (N)

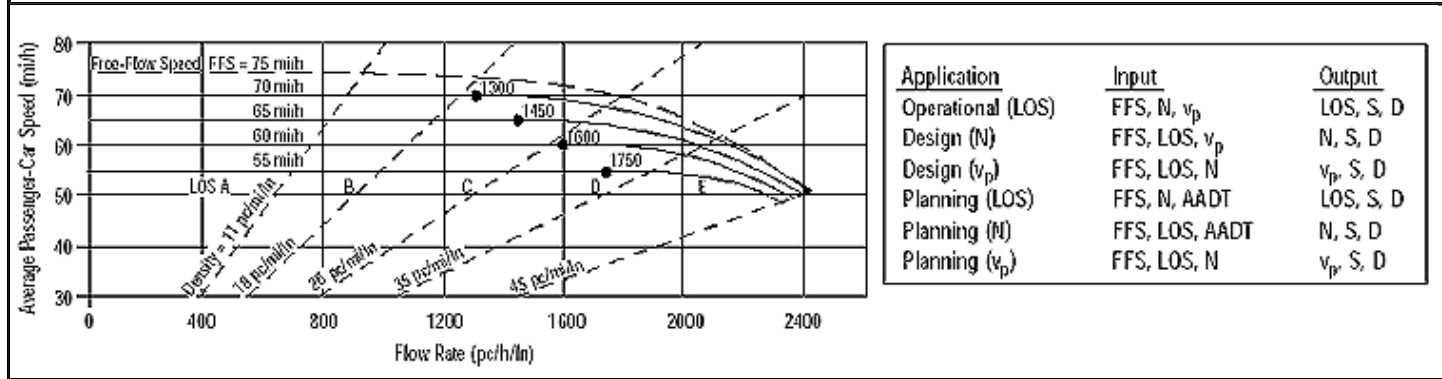
Operational (LOS)			Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1151	pc/h/ln	Design LOS	
S	70.0	mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	16.4	pc/mi/ln	S	mi/h
LOS	B		D = v _p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary

Factor Location

N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information		Site Information	
Analyst	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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

Flow Inputs			
Volume, V	5187	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

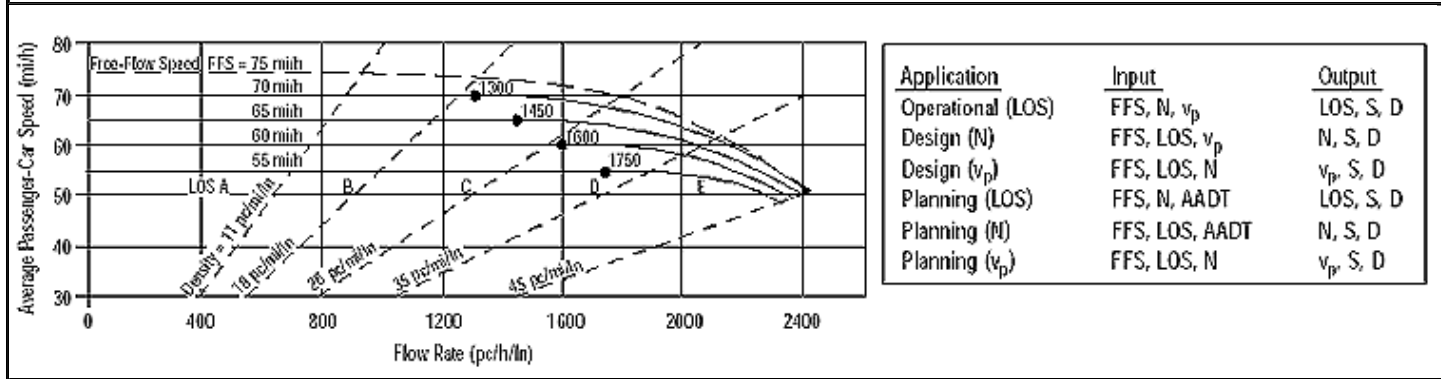
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/mi	f _{ID}	mi/h
Number of Lanes, N	5	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)	1187 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	
N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET



General Information **Site Information**

Analyst	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Taylor Rd/Rte 65
Date Performed	8/18/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - PM

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

Flow Inputs

Volume, V	6833	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	6
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
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)]	0.971

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	l/mi	f _{ID}	mi/h
Number of Lanes, N	5		f _N	mi/h
FFS (measured)	70.0	mi/h	FFS	70.0
Base free-flow Speed, BFFS		mi/h		

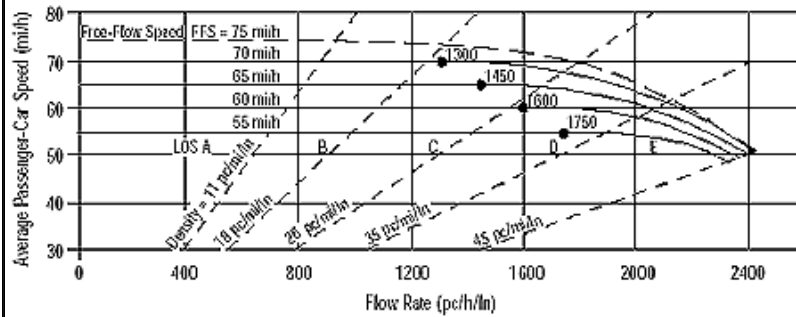
LOS and Performance Measures **Design (N)**

Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1564	Design LOS	
S	69.6	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	22.5	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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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

Flow Inputs			
Volume, V	4923	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

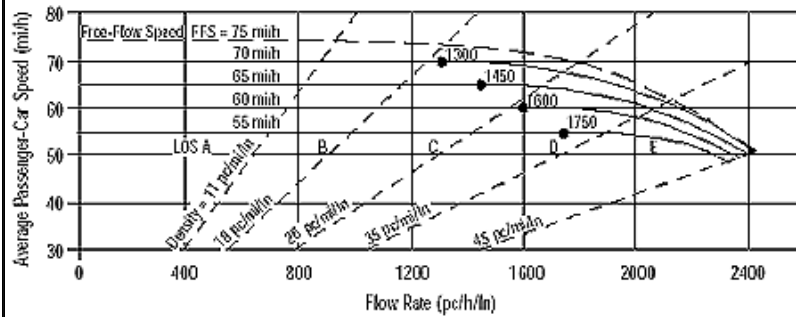
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1878 pc/h/ln	Design LOS	
S	66.9 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	28.1 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

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

Flow Inputs			
Volume, V	5545	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

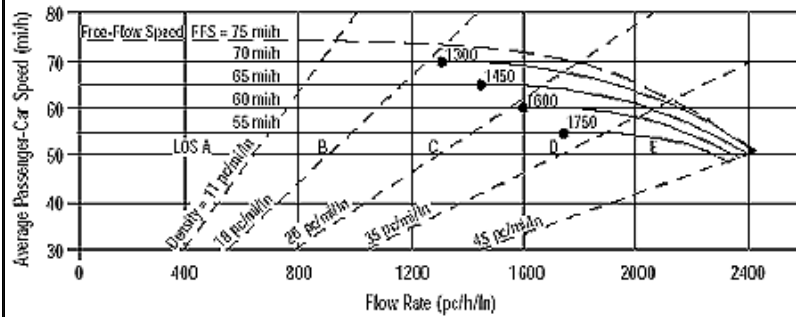
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	2115 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	
N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	5244	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

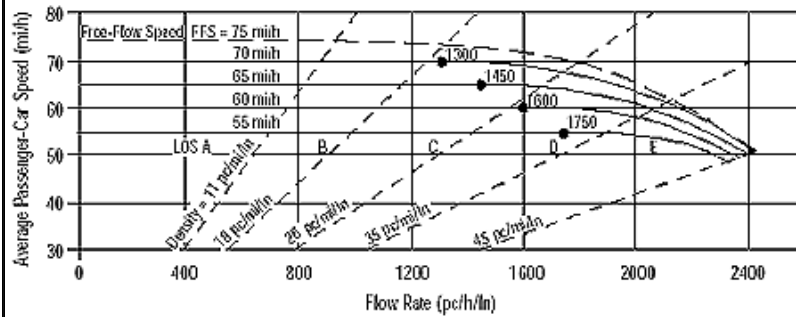
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	2000 pc/h/ln	Design LOS	
S	64.9 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	30.8 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Rte 65/Rocklin Rd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	6155	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

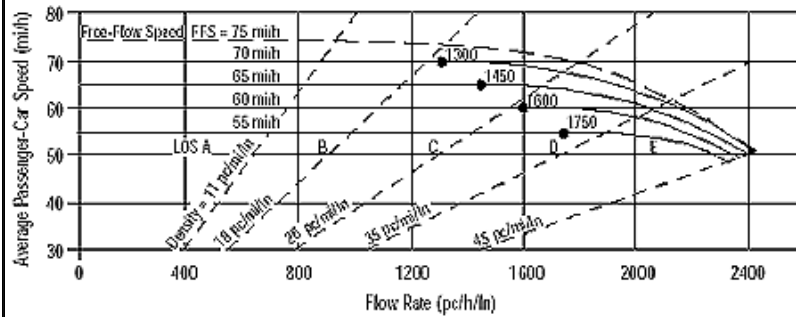
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	2348 pc/h/ln	Design LOS	
S	55.3 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	42.5 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	4594	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

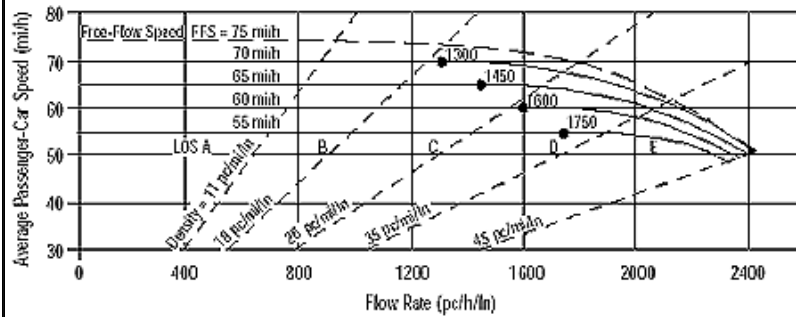
Calculate Flow Adjustments			
f _p	1.00		E _R
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]

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 l/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)	1753 pc/h/ln	Design LOS	
S	68.3 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	25.7 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

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

Flow Inputs			
Volume, V	5690	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

Calculate Flow Adjustments			
f _p	1.00		E _R
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]

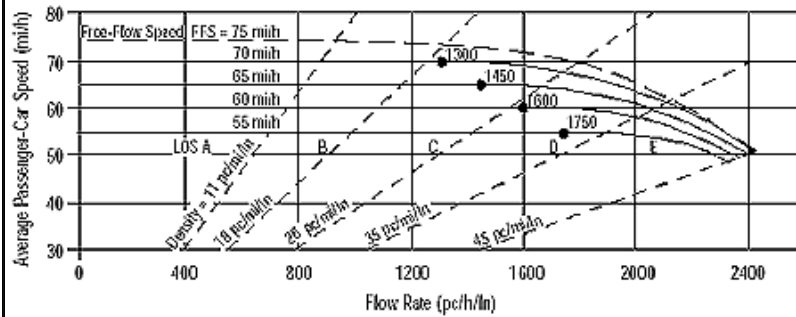
Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	f _{LW}	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	f _{LC}	mi/h
Interchange Density	0.50 l/mi	f _{ID}	mi/h
Number of Lanes, N	3	f _N	mi/h
FFS (measured)	70.0 mi/h	FFS	70.0 mi/h
Base free-flow Speed, BFFS			

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 - Exhibits 23-8, 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			

BASIC FREEWAY SEGMENTS WORKSHEET																								
		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>		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
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	Arthur Black	Highway/Direction of Travel	I-80 WB																					
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd																					
Date Performed	6/1/2010	Jurisdiction	Rocklin																					
Analysis Time Period		Analysis Year																						
Project Description 2030 With Project WO - AM																								
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data																					
Flow Inputs																								
Volume, V	5354	veh/h	Peak-Hour Factor, PHF	0.90																				
AADT		veh/day	%Trucks and Buses, P _T	6																				
Peak-Hr Prop. of AADT, K			%RVs, P _R	0																				
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)]	0.971																				
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	l/mi	f _{ID}	mi/h																				
Number of Lanes, N	3		f _N	mi/h																				
FFS (measured)	70.0	mi/h	FFS	70.0																				
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)	2042	pc/h/ln	Design LOS																					
S	64.0	mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h																				
D = v _p / S	31.9	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 - Exhibits 23-8, 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																								

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Rocklin Rd/Sierra College Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

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

Flow Inputs			
Volume, V	5927	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

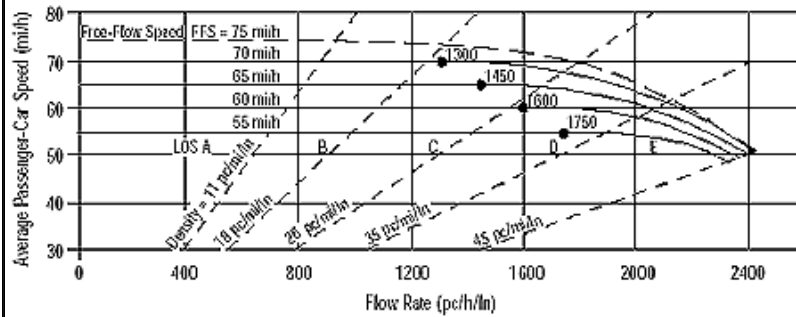
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	2261 pc/h/ln	Design LOS	
S	58.3 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	38.8 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - AM

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	3524	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

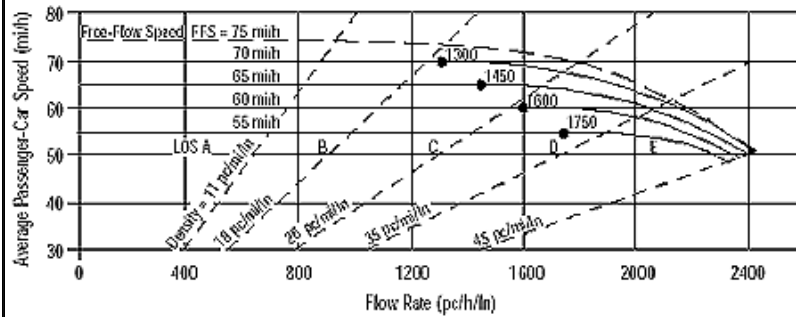
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1344 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	19.2 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 EB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - PM

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	5514	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

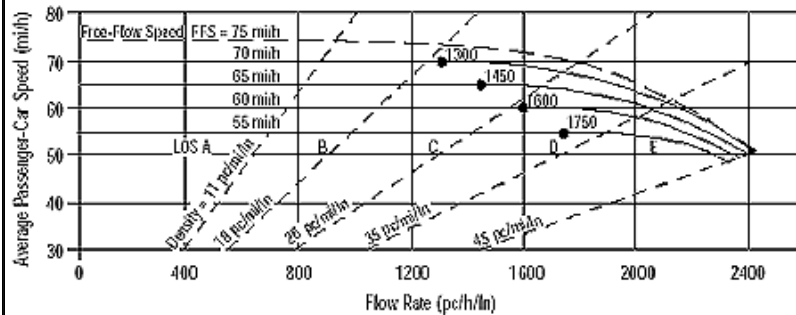
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	2103 pc/h/ln	Design LOS	
S	62.6 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	33.6 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - AM

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	5068	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 6
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

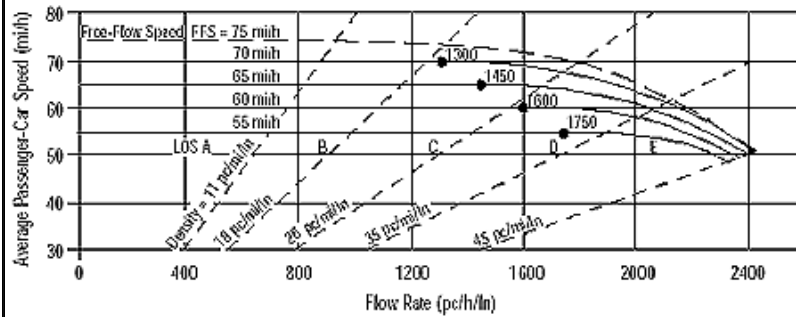
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 l/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)	1933 pc/h/ln	Design LOS	
S	66.0 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	29.3 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	I-80 WB
Agency or Company	LSA	From/To	Sierra College Blvd/Horseshoe
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - PM

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	4902	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

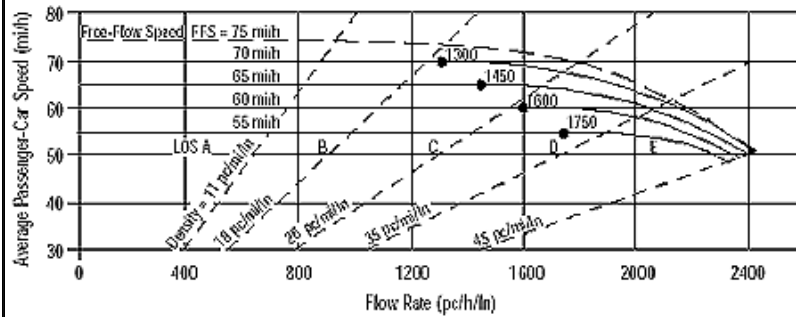
Calculate Flow Adjustments			
f _p	1.00		E _R
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]

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 l/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			

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1870 pc/h/ln	Design LOS	
S	67.0 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	27.9 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	I-80 to Harding Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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

Flow Inputs			
Volume, V	6379	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

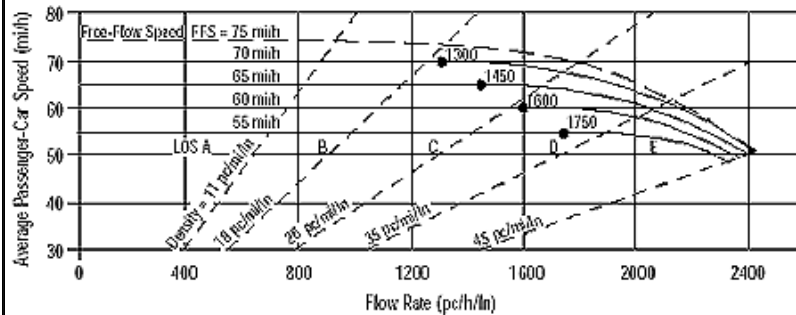
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	2540 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 - Exhibits 23-8, 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			

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 *Arthur Black*
 Agency or Company *LSA*
 Date Performed *6/1/2010*
 Analysis Time Period
 Project Description *2030 With Project WO - PM*

Site Information

Highway/Direction of Travel *Rte-65 NB*
 From/To *I-80 to Harding Blvd*
 Jurisdiction *Rocklin*
 Analysis Year

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

Flow Inputs

Volume, V	<i>6198</i>	veh/h	Peak-Hour Factor, PHF	<i>0.90</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>15</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
Driver type adjustment	<i>1.00</i>		Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.930</i>

Speed Inputs

Lane Width	<i>12.0</i>	ft
Rt-Shoulder Lat. Clearance	<i>6.0</i>	ft
Interchange Density	<i>0.50</i>	l/mi
Number of Lanes, N	<i>3</i>	
FFS (measured)	<i>70.0</i>	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	<i>70.0</i>	mi/h

LOS and Performance Measures

Operational (LOS)
 v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) *2468* 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

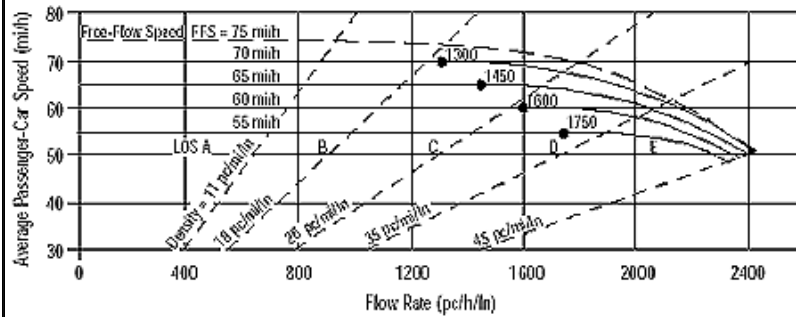
Glossary

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 - Exhibits 23-8, 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

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	I-80 to Harding Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	

Project Description 2030 With Project WO - AM

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

Flow Inputs			
Volume, V	4769	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

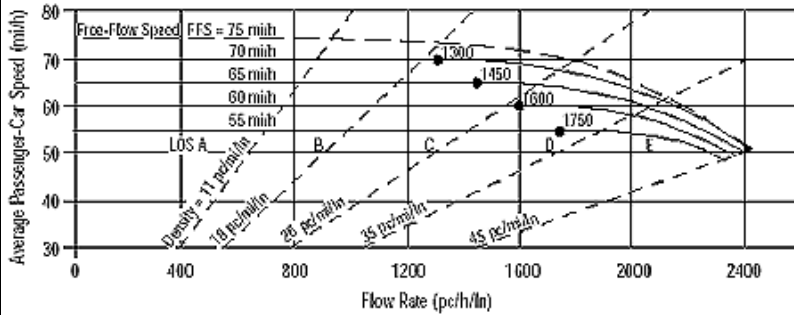
Calculate Flow Adjustments			
f _p	1.00		E _R
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]

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 l/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)	1899 pc/h/ln	Design LOS	
S	66.6 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	28.5 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	I-80 to Harding Blvd
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

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

Flow Inputs			
Volume, V	5729	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

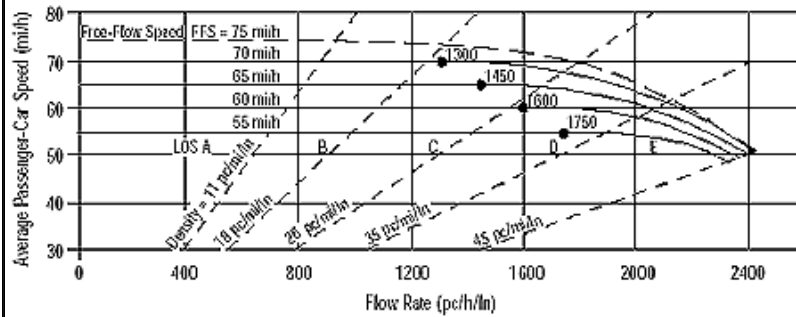
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	2281 pc/h/ln	Design LOS	
S	57.6 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	39.6 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Harding Blvd/Pleasant Grove
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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

Flow Inputs			
Volume, V	5558	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

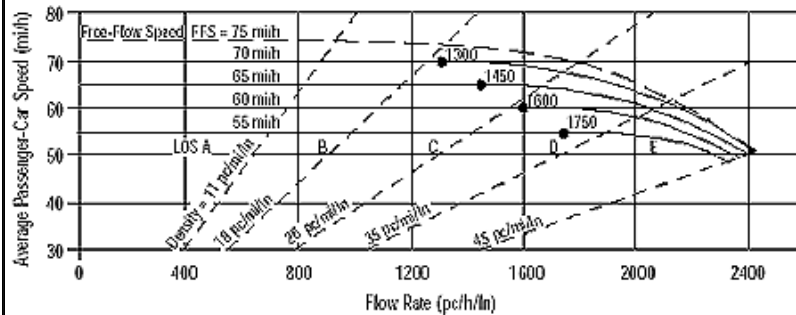
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.930

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 l/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			

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	2213 pc/h/ln	Design LOS	
S	59.7 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	
N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Harding Blvd/Pleasant Grove
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	5736	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

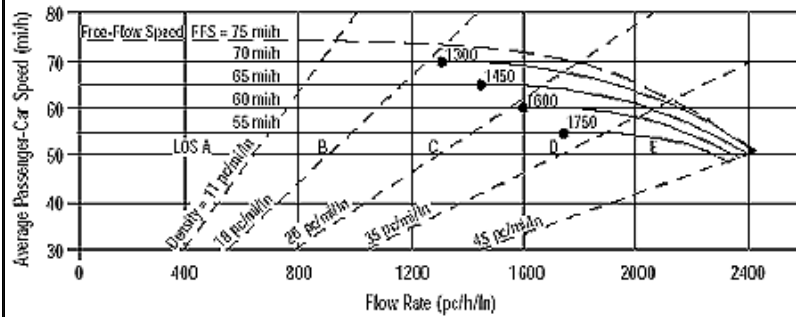
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	2284 pc/h/ln	Design LOS	
S	57.5 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	39.7 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	Harding Blvd/Pleasant Grove
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	4866	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

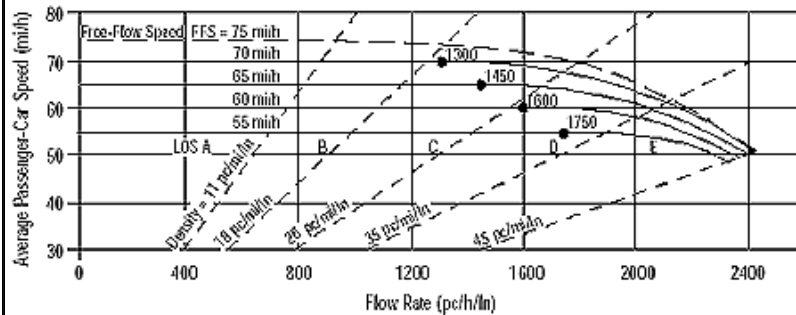
Calculate Flow Adjustments			
f _p	1.00		E _R 1.2
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] 0.930

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 l/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)	1937 pc/h/ln	Design LOS	
S	66.0 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	29.4 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	Harding Blvd/Pleasant Grove
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	5437	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

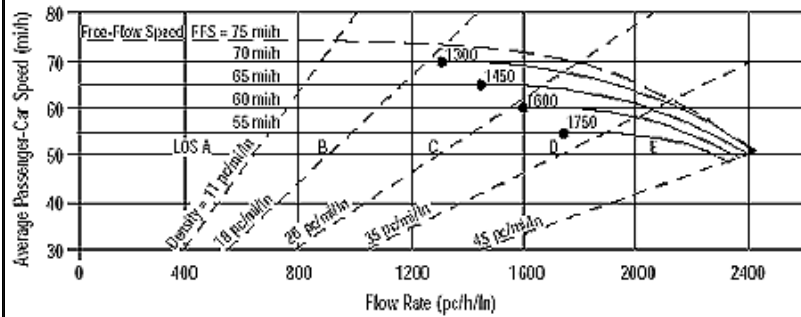
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	2165 pc/h/ln	Design LOS	
S	61.1 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	35.4 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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

Flow Inputs			
Volume, V	4652	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

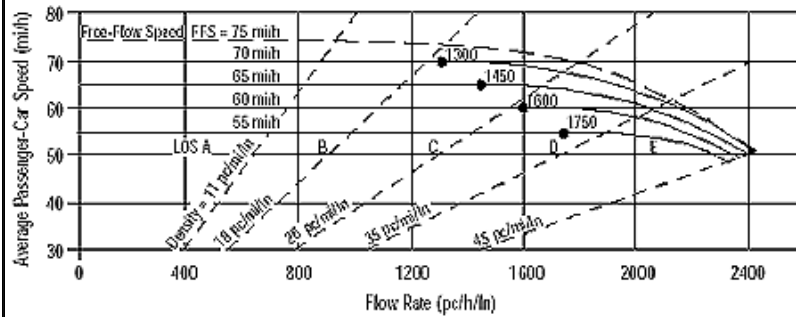
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	1852 pc/h/ln	Design LOS	
S	67.2 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	27.5 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 NB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

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

Flow Inputs			
Volume, V	5290	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, P _T 15
Peak-Hr Prop. of AADT, K			%RVs, P _R 0
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 %

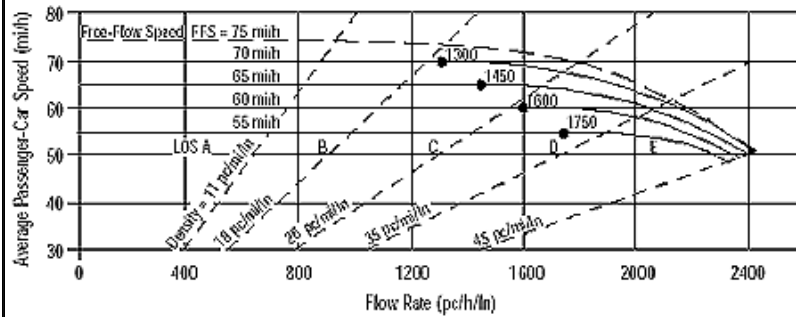
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	2106 pc/h/ln	Design LOS	
S	62.6 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	33.7 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - AM			

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Flow Inputs			
Volume, V	4432	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

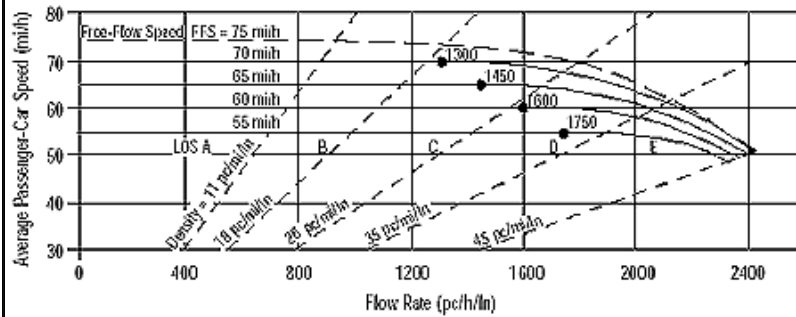
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.930

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 l/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)	1765 pc/h/ln	Design LOS	
S	68.2 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	25.9 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 - Exhibits 23-8, 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			

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	Arthur Black	Highway/Direction of Travel	Rte-65 SB
Agency or Company	LSA	From/To	Pleasant Grove/Blue Oaks
Date Performed	6/1/2010	Jurisdiction	Rocklin
Analysis Time Period		Analysis Year	
Project Description 2030 With Project WO - PM			

<input checked="" type="checkbox"/> Oper.(LOS)	<input type="checkbox"/> Des.(N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	4488	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
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)]	0.930

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 l/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)	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	
N - Number of lanes	S - Speed	E _R - Exhibits 23-8, 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			