

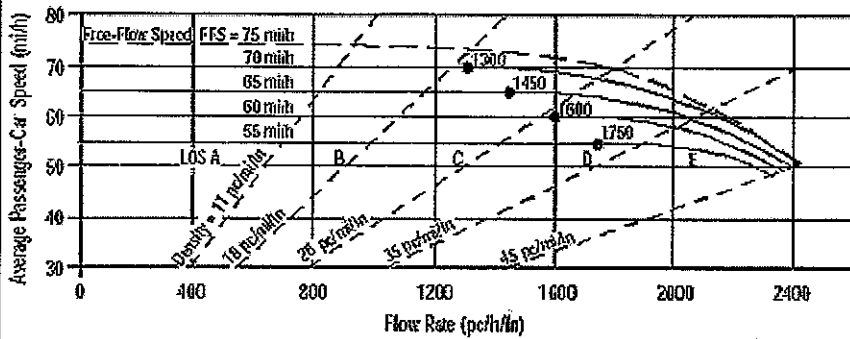
APPENDIX L

EXISTING TRAFFIC CONDITIONS FREEWAY SEGMENT LEVEL OF SERVICE CALCULATION WORKSHEETS – CALTRANS FACILITIES ANALYSIS (HCM METHODOLOGY)

APPENDIX L-1

**EXISTING TRAFFIC CONDITIONS – CALTRANS
FREEWAY SEGMENT ANALYSIS (HCM
METHODOLOGY)**

BASIC FREEWAY SEGMENTS WORKSHEET



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

General Information

Analyst: ZS
 Agency or Company: LLG Engineers
 Date Performed: 07/14/10
 Analysis Time Period: AM Peak Hour

Site Information

Highway/Direction of Travel: SR-57 NB
 From/To: Orangewood and Katella
 Jurisdiction: Caltrans D12
 Analysis Year: Existing 2008

Project Description: AM Existing (Year 2008) SR-57 NB Orangewood to Katella

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	4750 veh/h	Peak-Hour Factor, PHF	0.87
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

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	l/mi
Number of Lanes, N	5	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

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

LOS and Performance Measures

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1125	pc/h/ln
S	70.0	mi/h
$D = v_p / S$	16.1	pc/mi/ln
LOS	B	

Design (N)

Design (N)

Design LOS

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		pc/h
S		mi/h
$D = v_p / S$		pc/mi/ln

Required Number of Lanes, N

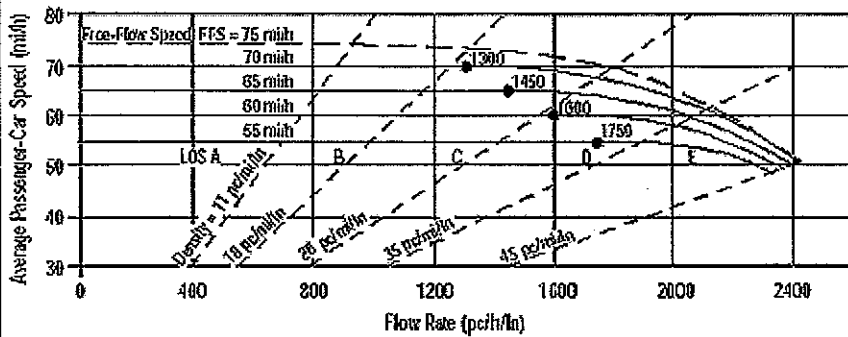
Glossary

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: ZS
 Agency or Company: LLG Engineers
 Date Performed: 07/14/10
 Analysis Time Period: PM Peak Hour

Site Information

Highway/Direction of Travel: SR-57 NB
 From/To: Orangewood and Katella
 Jurisdiction: Caltrans D12
 Analysis Year: Existing 2008

Project Description: PM Existing (Year 2008) SR-57 NB Orangewood to Katella

Oper. (LOS)

Des. (N)

Planning Data

Flow Inputs

Volume, V	7790 veh/h	Peak-Hour Factor, PHF	0.87
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

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	1/mi
Number of Lanes, N	5	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

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

LOS and Performance Measures

Operational (LOS)		
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1845	pc/h/ln
S	67.3	mi/h
$D = v_p / S$	27.4	pc/mi/ln
LOS	D	

Design (N)

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

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume

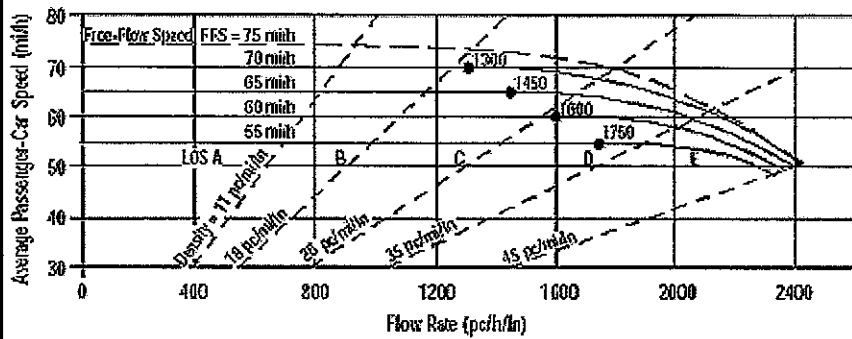
S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 23-8, 23-10
 E_T - Exhibits 23-8, 23-10, 23-11
 f_p - Page 23-12
 LOS, S, FFS, v_p - Exhibits 23-2, 23-3

f_{LW} - Exhibit 23-4
 f_{LC} - Exhibit 23-5
 f_N - Exhibit 23-6
 f_{ID} - Exhibit 23-7

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p , S, D
Planning (LOS)	FFS, N, 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: ZS
 Agency or Company: LLG Engineers
 Date Performed: 07/14/10
 Analysis Time Period: AM Peak Hour

Site Information

Highway/Direction of Travel: SR-57 SB
 From/To: Orangewood and Katella
 Jurisdiction: Caltrans D12
 Analysis Year: Existing 2008

Project Description: AM Existing (Year 2008) SR-57 SB Orangewood to Katella

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	6350 veh/h	Peak-Hour Factor, PHF	0.87
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

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	1/mi
Number of Lanes, N	5	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

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

LOS and Performance Measures

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ 1504 pc/h/ln

S 69.8 mi/h

$D = v_p / S$ 21.5 pc/mi/ln

LOS C

Design (N)

Design (N)

Design LOS

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h

S mi/h

$D = v_p / S$ pc/mi/ln

Required Number of Lanes, N

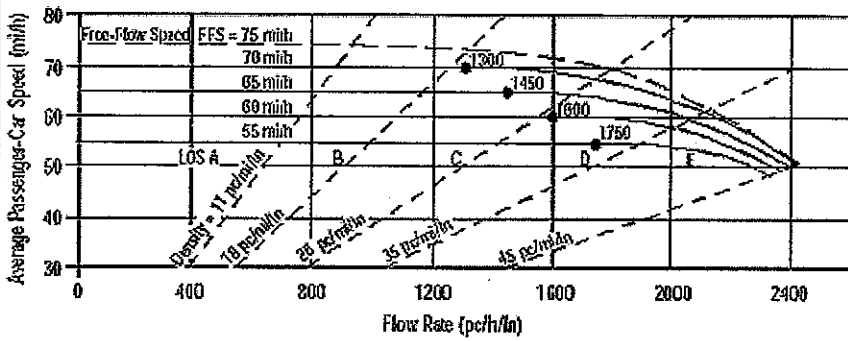
Glossary

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	ZS	Highway/Direction of Travel	SR-57 SB
Agency or Company	LLG Engineers	From/To	Orangewood and Katella
Date Performed	07/14/10	Jurisdiction	Caltrans D12
Analysis Time Period	PM Peak Hour	Analysis Year	Existing 2008
Project Description PM Existing (Year 2008) SR-57 SB Orangewood to Katella			

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

Flow Inputs			
Volume, V	7750 veh/h	Peak-Hour Factor, PHF	0.87
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 %	

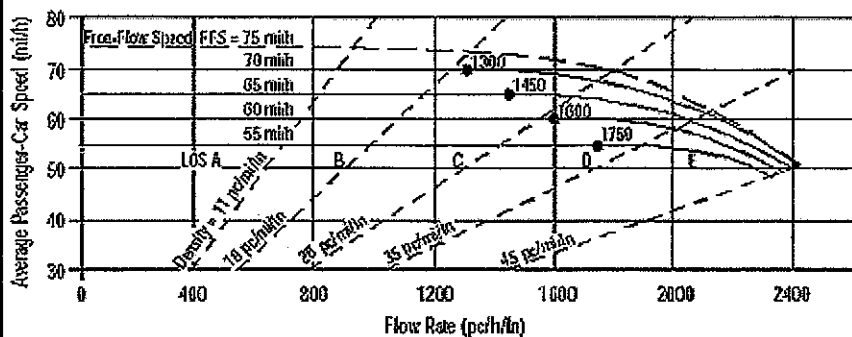
Calculate Flow Adjustments			
f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1 / [1 + P_T(E_T - 1) + P_R(E_R - 1)]$	0.971

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 I/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)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1835 pc/h/ln	Design LOS	
S	67.4 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	27.2 pc/mi/ln	S	mi/h
LOS	D	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - 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: ZS
 Agency or Company: LLG Engineers
 Date Performed: 07/14/10
 Analysis Time Period: AM Peak Hour

Site Information

Highway/Direction of Travel: SR-57 NB
 From/To: Katella and Ball
 Jurisdiction: Caltrans D12
 Analysis Year: Existing 2008

Project Description: AM Existing (Year 2008) SR-57 NB Katella and Ball

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	4590 veh/h	Peak-Hour Factor, PHF	0.87
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

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	1/mi
Number of Lanes, N	4	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

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

LOS and Performance Measures

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ 1359 pc/h/ln

S 70.0 mi/h

$D = v_p / S$ 19.4 pc/mi/ln

LOS C

Design (N)

Design (N)

Design LOS

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h

f_p

S mi/h

$D = v_p / S$ pc/mi/ln

Required Number of Lanes, N

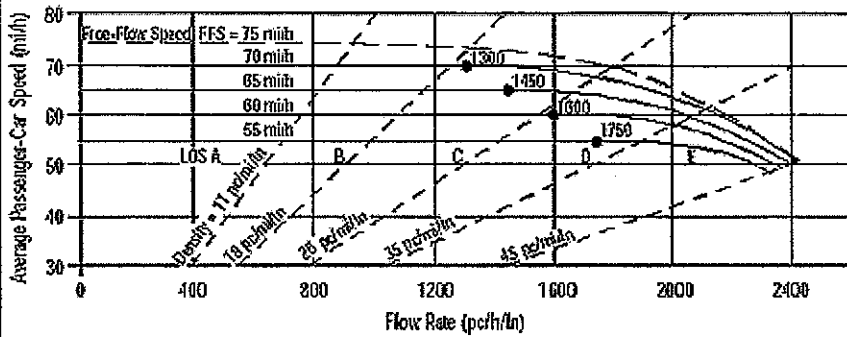
Glossary

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	ZS	Highway/Direction of Travel	SR-57 NB
Agency or Company	LLG Engineers	From/To	Katella and Ball
Date Performed	07/14/10	Jurisdiction	Caltrans D12
Analysis Time Period	PM Peak Hour	Analysis Year	Existing 2008
Project Description PM Existing (Year 2008) SR-57 NB Katella and Ball			

<input checked="" type="checkbox"/> Oper. (LOS)	<input type="checkbox"/> Des. (N)	<input type="checkbox"/> Planning Data
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Flow Inputs			
Volume, V	7950 veh/h	Peak-Hour Factor, PHF	0.87
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 %	

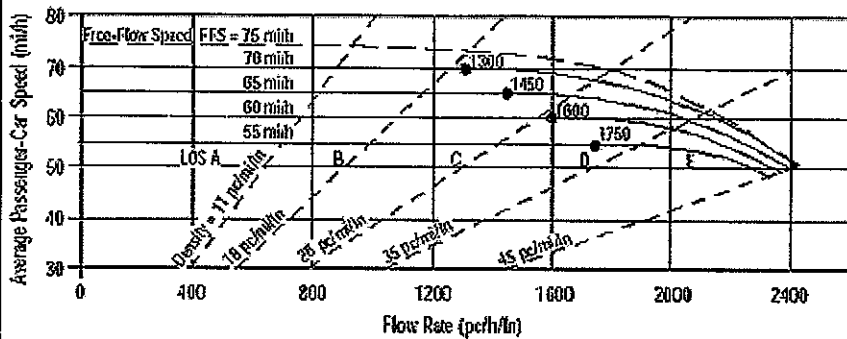
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971

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 1/mi	f _{ID}	mi/h
Number of Lanes, N	4	f _N	mi/h
FFS (measured)	70.0 mi/h	FFS	70.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	2353 pc/h/ln	Design LOS	
S	55.1 mi/h	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h
D = v _p / S	42.7 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

Analyst: ZS
 Agency or Company: LLG Engineers
 Date Performed: 07/14/10
 Analysis Time Period: AM Peak Hour

Site Information

Highway/Direction of Travel: SR-57 SB
 From/To: Katella and Ball
 Jurisdiction: Caltrans D12
 Analysis Year: Existing 2008

Project Description: AM Existing (Year 2008) SR-57 SB Katella and Ball

Oper. (LOS)

Des. (N)

Planning Data

Flow Inputs

Volume, V	6360 veh/h	Peak-Hour Factor, PHF	0.87
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

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	1/mi
Number of Lanes, N	4	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

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

LOS and Performance Measures

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1882	pc/h/ln
S	66.8	mi/h
$D = v_p / S$	28.2	pc/mi/ln
LOS	D	

Design (N)

Design (N)

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

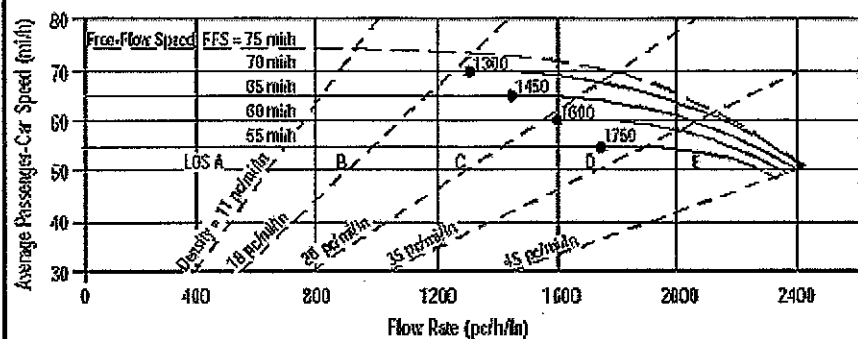
Glossary

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: ZS
 Agency or Company: LLG Engineers
 Date Performed: 07/14/10
 Analysis Time Period: PM Peak Hour

Site Information

Highway/Direction of Travel: SR-57 SB
 From/To: Katella and Ball
 Jurisdiction: Caltrans D12
 Analysis Year: Existing 2008

Project Description: PM Existing (Year 2008) SR-57 SB Katella and Ball

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

Flow Inputs

Volume, V	7380 veh/h	Peak-Hour Factor, PHF	0.87
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

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	l/mi
Number of Lanes, N	4	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

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

LOS and Performance Measures

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ 2184 pc/h/ln

S 60.6 mi/h

$D = v_p / S$ 36.1 pc/mi/ln

LOS E

Design (N)

Design (N)

Design LOS

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ 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