
APPENDIX D
HCS ANALYSIS, UPDATE TO APPENDIX D WITHIN
APPENDIX 4.13-1, TRAFFIC IMPACT ANALYSIS FOR
MITCHELL RANCH CENTER
FEHR & PEERS
MARCH 2010

APPENDIX D: FREEWAY MAINLINE ANALYSIS WORKSHEETS

Existing

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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		AM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		4252		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				%Trucks and Buses, P_T																						
DDHV = AADT x K x D				%RVs, P_R																						
Driver type adjustment		1.00		General Terrain:																						
				Grade % Length																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1677			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
64.6			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
25.9			pc/mi/ln																							
LOS			Required Number of Lanes, N																							
C																										
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																										
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3091		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
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																										
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		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		65.0		mi/h																						
LOS and Performance Measures																										
Operational (LOS)																										
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		1219		pc/h/ln																						
S		65.0		mi/h																						
$D = v_p / S$		18.8		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				mi/h																						
S				mi/h																						
$D = v_p / S$				pc/mi/ln																						
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N - Number of lanes		S - Speed																								
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v_p - Flow rate		FFS - Free-flow speed																								
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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																								

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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																								
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General Information			Site Information																							
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Analysis Time Period		AM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		4500		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1775			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
64.1			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
27.7			pc/mi/ln																							
LOS			D																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
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																							
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			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																							

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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																								
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General Information			Site Information																							
Analyst		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3600		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1420			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
65.0			mi/h																							
D = v_p / S			D = v_p / S																							
21.8			pc/mi/ln																							
LOS			Required Number of Lanes, N																							
C																										
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
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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																								
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Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3281		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
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LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1294		pc/h/ln																						
S		65.0		mi/h																						
$D = v_p / S$		19.9		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																						
V - Hourly volume		D - Density		f_{LV} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
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				f_{ID} - Exhibit 23-7																						

BASIC FREEWAY SEGMENTS WORKSHEET																										
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		4374		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1725			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
64.4			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
26.8			pc/mi/ln																							
LOS			D																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
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																										
			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																										
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		AM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		4040		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1594		pc/h/ln																						
S		64.9		mi/h																						
$D = v_p / S$		24.6		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																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																										
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		5000		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1972			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
61.9			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
31.9			pc/mi/ln																							
LOS			D																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
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																							
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			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																							

Existing Plus Project

BASIC FREEWAY SEGMENTS WORKSHEET																										
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/08		Jurisdiction																						
Analysis Time Period		AM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		4281		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1689		pc/h/ln																						
S		64.6		mi/h																						
$D = v_p / S$		26.1		pc/mi/ln																						
LOS		D																								
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LV} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
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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		LML	Highway/Direction of Travel		NB State Route 99																					
Agency or Company		Fehr & Peers	From/To		North of Mitchell																					
Date Performed		5/20/2008	Jurisdiction		Caltrans District 10																					
Analysis Time Period		PM Peak Hour	Analysis Year		Existing + Project Conditions																					
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3198	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}																						
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}																						
Interchange Density		0.50	l/mi	f_{ID}																						
Number of Lanes, N		3		f_N																						
FFS (measured)		65.0	mi/h	FFS																						
Base free-flow Speed, BFFS			mi/h	65.0																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p		1261	pc/h/ln	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
S		65.0	mi/h	S																						
$D = v_p / S$		19.4	pc/mi/ln	$D = v_p / S$																						
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																										
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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 <i>LML</i>		Highway/Direction of Travel <i>NB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>South of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Existing + Project Conditions</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>4550</i>		veh/h		Peak-Hour Factor, PHF <i>0.90</i>																						
AADT		veh/day		%Trucks and Buses, P_T <i>13</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>0.939</i>																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i>		ft		f_{LW} <i>mi/h</i>																						
Rt-Shoulder Lat. Clearance <i>6.0</i>		ft		f_{LC} <i>mi/h</i>																						
Interchange Density <i>0.50</i>		l/mi		f_{ID} <i>mi/h</i>																						
Number of Lanes, N <i>3</i>				f_N <i>mi/h</i>																						
FFS (measured) <i>65.0</i>		mi/h		FFS <i>65.0</i> <i>mi/h</i>																						
Base free-flow Speed, BFFS		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p <i>1795</i>		pc/h/ln		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
f_p				pc/h																						
S <i>63.9</i>		mi/h		f_p																						
D = v_p / S		<i>28.1</i>		mi/h																						
LOS <i>D</i>		pc/mi/ln		S																						
				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																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																						

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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3738		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1474		pc/h/ln																						
S		65.0		mi/h																						
$D = v_p / S$		22.7		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																						
V - Hourly volume		D - Density		f_{LV} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																						

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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 <i>LML</i>		Highway/Direction of Travel <i>SB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>North of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Existing + Project Conditions</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3318</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>13</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>0.939</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> I/mi		f_{ID} mi/h																								
Number of Lanes, N <i>3</i>		f_N mi/h																								
FFS (measured) <i>65.0</i> mi/h		FFS <i>65.0</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>1309</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>20.1</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			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																										

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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
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Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		4476		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1766		pc/h/ln																						
S		64.2		mi/h																						
$D = v_p / S$		27.5		pc/mi/ln																						
LOS		D																								
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
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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 <i>LML</i>		Highway/Direction of Travel <i>SB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>South of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Existing + Project Conditions</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>4080</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>13</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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DDHV = AADT x K x D veh/h		Grade % Length <i>mi</i>																								
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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>3</i>		f_N mi/h																								
FFS (measured) <i>65.0</i> mi/h		FFS <i>65.0</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>1609</i> pc/h/ln			$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.9</i> mi/h			S mi/h																							
$D = v_p / S$ <i>24.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			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

Site Information

Analyst	LML	Highway/Direction of Travel	SB State Route 99
Agency or Company	Fehr & Peers	From/To	South of Mitchell Road
Date Performed	5/20/2008	Jurisdiction	Caltrans District 10
Analysis Time Period	PM Peak Hour	Analysis Year	Existing + Project Conditions

Project Description	Mitchell Ranch WC07-2467
---------------------	--------------------------

☒ Oper.(LOS)

Des.(N)

Planning Data

Volume, V	5145	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, P _T	13
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 %	

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1 + P_T(E_T - 1) + P_R(E_R - 1)]$	0.939

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)	65.0	mi/h	f_N		mi/h
Base free-flow Speed, BFFS		mi/h	FFS	65.0	mi/h

	Design (N)
Control	10
Experimental	10

Operational (LOS)

$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$	2029	pc/h/ln
S	60.9	mi/h
$D = v_p / S$	33.3	pc/mi/ln
LOS	D	

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/h
Required Number of Lanes, N	

Factor	Location
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
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42	42
43	43
44	44
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58	58
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60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

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	

E _R - Exhibits 23-8, 23-10	f _{LR} - 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 _n - Exhibits 23-2, 23-3	f _{ID} - Exhibit 23-7

Cumulative

BASIC FREEWAY SEGMENTS WORKSHEET																										
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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 <i>LML</i>		Highway/Direction of Travel <i>NB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>North of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Cumulative No Project</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5787</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>13</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>0.939</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>3</i>		f_N mi/h																								
FFS (measured) <i>65.0</i> mi/h		FFS <i>65.0</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>2283</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>54.6</i> mi/h			S mi/h																							
$D = v_p / S$ <i>41.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			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																										
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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		LML	Highway/Direction of Travel		NB State Route 99																					
Agency or Company		Fehr & Peers	From/To		North of Mitchell Road																					
Date Performed		5/20/2008	Jurisdiction		Caltrans District 10																					
Analysis Time Period		PM Peak Hour	Analysis Year		Cumulative No Project																					
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V	3500	veh/h	Peak-Hour Factor, PHF	0.90																						
AADT		veh/day	%Trucks and Buses, P_T	13																						
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		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.939																						
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)	65.0	mi/h	FFS	65.0	mi/h																					
Base free-flow Speed, BFFS		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p	1381	pc/h/ln	v_p		pc/h																					
S	65.0	mi/h	f_p		mi/h																					
$D = v_p / S$	21.2	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																						
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		NB State Route 99																						
Date Performed		5/20/2008		From/To																						
Analysis Time Period		AM Peak Hour		Jurisdiction																						
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Project Description		Mitchell Ranch WC07-2467		Analysis Year																						
				Cumulative No Project																						
☒ Oper.(LOS)			☐ Des.(N)		☐ Planning Data																					
Flow Inputs																										
Volume, V		5861		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				0.90																						
DDHV = AADT x K x D				%Trucks and Buses, P_T																						
Driver type adjustment		1.00		13																						
				%RVs, P_R																						
				0																						
				General Terrain:																						
				Level																						
				Grade % Length																						
				mi																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		1.2																						
				$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p		2312		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
f_p				pc/h																						
S		53.6		f_p																						
D = v_p / S		43.2		mi/h																						
LOS		E		S																						
				mi/h																						
				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																						
V - Hourly volume		D - Density		f _{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E _T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f _{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f _p - Page 23-12																						
				f _N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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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																								
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Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3692		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00																								
E_T		1.5																								
				E_R																						
				1.2																						
				$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1456		pc/h/ln																						
S		65.0		mi/h																						
$D = v_p / S$		22.4		pc/mi/ln																						
LOS		C																								
			Design LOS																							
			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
			pc/h																							
			f_p																							
			mi/h																							
			S																							
			pc/mi/ln																							
			D = v_p / S																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E _R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f _{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E _T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f _{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																										
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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 <i>LML</i>		Highway/Direction of Travel <i>SB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>North of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Cumulative No Project</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3349</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT <i></i> veh/day		%Trucks and Buses, P_T <i>13</i>																								
Peak-Hr Prop. of AADT, K <i></i>		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D <i></i>		General Terrain: <i>Level</i>																								
DDHV = AADT x K x D <i></i> veh/h		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down % <i></i>																								
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>0.939</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i></i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i></i> mi/h																								
Interchange Density <i>0.50</i> l/mi		f_{ID} <i></i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i></i> mi/h																								
FFS (measured) <i>65.0</i> mi/h		FFS <i>65.0</i> mi/h																								
Base free-flow Speed, BFFS <i></i> 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>1321</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i></i> pc/h																							
S <i>65.0</i> mi/h			S <i></i> mi/h																							
$D = v_p / S$ <i>20.3</i> pc/mi/ln			$D = v_p / S$ <i></i> pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N <i></i>																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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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																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
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Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6687</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>13</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>																								
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Speed Inputs			Calc Speed Adj and FFS																							
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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>2638</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			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																										
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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																								
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General Information			Site Information																							
Analyst <i>LML</i>		Highway/Direction of Travel <i>SB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>South of Mitchell Road</i>																								
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Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6386</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT <i></i> veh/day		%Trucks and Buses, P_T <i>13</i>																								
Peak-Hr Prop. of AADT, K <i></i>		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D <i></i>		General Terrain: <i>Level</i>																								
DDHV = AADT x K x D <i></i> veh/h		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down % <i></i>																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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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>2519</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i></i> pc/h																							
S <i></i> mi/h			S <i></i> mi/h																							
$D = v_p / S$ <i></i> pc/mi/ln			$D = v_p / S$ <i></i> pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N <i></i>																							
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N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
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FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It includes Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<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																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>4058</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>13</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Base free-flow Speed, BFFS																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1601</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.9</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>24.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			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																							
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LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Cumulative Plus Project

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It includes Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<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		LML	Highway/Direction of Travel		NB State Route 99																					
Agency or Company		Fehr & Peers	From/To		North of Mitchell Road																					
Date Performed		5/20/2008	Jurisdiction		Caltrans District 10																					
Analysis Time Period		AM Peak Hour	Analysis Year		Cumulative Plus Project																					
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V	5820	veh/h	Peak-Hour Factor, PHF	0.90																						
AADT		veh/day	%Trucks and Buses, P_T	13																						
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		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.939																						
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)	65.0	mi/h	FFS	65.0	mi/h																					
Base free-flow Speed, BFFS		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p	2296	pc/h/ln	v_p		pc/h																					
S	54.1	mi/h	S		mi/h																					
$D = v_p / S$	42.4	pc/mi/ln	$D = v_p / S$		pc/mi/ln																					
LOS	E		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																										

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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3620		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1428		pc/h/ln																						
S		65.0		mi/h																						
$D = v_p / S$		22.0		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																						
V - Hourly volume		D - Density		f_{LV} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		AM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		5900		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
2327			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
53.1			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
43.9			pc/mi/ln																							
LOS			Required Number of Lanes, N																							
E																										
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
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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		LML	Highway/Direction of Travel		NB State Route 99																					
Agency or Company		Fehr & Peers	From/To		South of Mitchell Road																					
Date Performed		5/20/2008	Jurisdiction		Caltrans District 10																					
Analysis Time Period		PM Peak Hour	Analysis Year		Cumulative Plus Project																					
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V	3800	veh/h	Peak-Hour Factor, PHF	0.90																						
AADT		veh/day	%Trucks and Buses, P_T	13																						
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		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.939																						
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)	65.0	mi/h	FFS	65.0	mi/h																					
Base free-flow Speed, BFFS		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p	1499	pc/h/ln	v_p		pc/h																					
S	65.0	mi/h	S		mi/h																					
$D = v_p / S$	23.1	pc/mi/ln	$D = v_p / S$		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																						
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Application	Input	Output																								
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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 <i>LML</i>		Highway/Direction of Travel <i>SB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>North of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Cumulative Plus Project</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3380</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>13</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>0.939</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>3</i>		f_N		mi/h																						
FFS (measured) <i>65.0</i> mi/h		FFS		65.0 mi/h																						
Base free-flow Speed, BFFS																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1333</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>20.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			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																										
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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		LML	Highway/Direction of Travel		SB State Route 99																					
Agency or Company		Fehr & Peers	From/To		North of Mitchell Road																					
Date Performed		5/20/2008	Jurisdiction		Caltrans District 10																					
Analysis Time Period		PM Peak Hour	Analysis Year		Cumulative Plus Project																					
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6800	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	13																					
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		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.939																					
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)		65.0	mi/h	FFS	65.0																					
Base free-flow Speed, BFFS			mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
S			S																							
$D = v_p / S$			$D = v_p / S$																							
LOS			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																					
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		PM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6500		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		0.50		l/mi																						
Number of Lanes, N		3																								
FFS (measured)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
2564			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
mi/h			mi/h																							
D = v_p / S			D = v_p / S																							
LOS			Required Number of Lanes, N																							
F																										
Glossary			Factor Location																							
N - Number of lanes			S - Speed																							
V - Hourly volume			D - Density																							
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LOS - Level of service			BFFS - Base free-flow speed																							
DDHV - Directional design hour volume																										
			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																							

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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 <i>LML</i>		Highway/Direction of Travel <i>SB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>South of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Cumulative Plus Project</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>4100</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT <i></i> veh/day		%Trucks and Buses, P_T <i>13</i>																								
Peak-Hr Prop. of AADT, K <i></i>		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D <i></i>		General Terrain: <i>Level</i>																								
DDHV = AADT x K x D <i></i> veh/h		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down % <i></i>																								
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>0.939</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i></i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i></i> mi/h																								
Interchange Density <i>0.50</i> I/mi		f_{ID} <i></i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i></i> mi/h																								
FFS (measured) <i>65.0</i> mi/h		FFS <i>65.0</i> mi/h																								
Base free-flow Speed, BFFS <i></i> 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>1617</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i></i> pc/h																							
S <i>64.8</i> mi/h			S <i></i> mi/h																							
$D = v_p / S$ <i>24.9</i> pc/mi/ln			$D = v_p / S$ <i></i> pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N <i></i>																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

Mitigation

BASIC FREEWAY SEGMENTS WORKSHEET																										
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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 <i>LML</i>		Highway/Direction of Travel <i>NB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>North of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Cumulative Plus Project + Mit</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5820</i>		veh/h		Peak-Hour Factor, PHF <i>0.90</i>																						
AADT		veh/day		%Trucks and Buses, P_T <i>13</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>0.939</i>																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i>		ft		f_{LW} <i>mi/h</i>																						
Rt-Shoulder Lat. Clearance <i>6.0</i>		ft		f_{LC} <i>mi/h</i>																						
Interchange Density <i>0.50</i>		l/mi		f_{ID} <i>mi/h</i>																						
Number of Lanes, N <i>4</i>				f_N <i>mi/h</i>																						
FFS (measured) <i>65.0</i>		mi/h		FFS <i>65.0</i> <i>mi/h</i>																						
Base free-flow Speed, BFFS		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p <i>1722</i>		pc/h/ln		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
f_p				f_p <i>pc/h</i>																						
S <i>64.4</i>		mi/h		S <i>mi/h</i>																						
$D = v_p / S$		<i>26.7</i>		$D = v_p / S$ <i>pc/mi/ln</i>																						
LOS <i>D</i>				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																						
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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																						
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Application	Input	Output																								
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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																								
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Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		3620	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	13																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
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Calculate Flow Adjustments																										
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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		4		f_N	mi/h																					
FFS (measured)		65.0	mi/h	FFS	65.0																					
Base free-flow Speed, BFFS			mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1071	pc/h/ln	v_p																						
S		65.0	mi/h	S																						
$D = v_p / S$		16.5	pc/mi/ln	$D = v_p / S$																						
LOS		B		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																										
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		AM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		5900		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				%Trucks and Buses, P_T																						
DDHV = AADT x K x D				%RVs, P_R																						
Driver type adjustment		1.00		General Terrain:																						
				Grade % Length																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
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)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
			FFS																							
			65.0																							
			mi/h																							
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1745			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
64.3			mi/h																							
D = v_p / S			D = v_p / S																							
27.1			pc/mi/ln																							
LOS			D																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<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		LML	Highway/Direction of Travel		NB State Route 99																					
Agency or Company		Fehr & Peers	From/To		South of Mitchell Road																					
Date Performed		5/20/2008	Jurisdiction		Caltrans District 10																					
Analysis Time Period		PM Peak Hour	Analysis Year		Cumulative Plus Project + Mit																					
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V	3800	veh/h	Peak-Hour Factor, PHF	0.90																						
AADT		veh/day	%Trucks and Buses, P_T	13																						
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		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.939																						
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	4		f_N		mi/h																					
FFS (measured)	65.0	mi/h	FFS	65.0	mi/h																					
Base free-flow Speed, BFFS		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p	1124	pc/h/ln	v_p		pc/h																					
S	65.0	mi/h	S		mi/h																					
$D = v_p / S$	17.3	pc/mi/ln	$D = v_p / S$		pc/mi/ln																					
LOS	B		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																										

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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 <i>LML</i>		Highway/Direction of Travel <i>SB State Route 99</i>																								
Agency or Company <i>Fehr & Peers</i>		From/To <i>North of Mitchell Road</i>																								
Date Performed <i>5/20/2008</i>		Jurisdiction <i>Caltrans District 10</i>																								
Analysis Time Period <i>AM Peak Hour</i>		Analysis Year <i>Cumulative Plus Project + Mit</i>																								
Project Description <i>Mitchell Ranch WC07-2467</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3380</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT <i></i> veh/day		%Trucks and Buses, P_T <i>13</i>																								
Peak-Hr Prop. of AADT, K <i></i>		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D <i></i>		General Terrain: <i>Level</i>																								
DDHV = AADT x K x D <i></i> veh/h		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down % <i></i>																								
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>0.939</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i></i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i></i> mi/h																								
Interchange Density <i>0.50</i> I/mi		f_{ID} <i></i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i></i> mi/h																								
FFS (measured) <i>65.0</i> mi/h		FFS <i>65.0</i> mi/h																								
Base free-flow Speed, BFFS <i></i> 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>1000</i> pc/h/ln			$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$ <i></i> pc/h																							
S <i>65.0</i> mi/h			S <i></i> mi/h																							
$D = v_p / S$ <i>15.4</i> pc/mi/ln			$D = v_p / S$ <i></i> pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N <i></i>																							
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																							
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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		LML	Highway/Direction of Travel		SB State Route 99																					
Agency or Company		Fehr & Peers	From/To		North of Mitchell Road																					
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Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6800	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	13																					
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		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.939																					
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		4		f_N	mi/h																					
FFS (measured)		65.0	mi/h	FFS	65.0																					
Base free-flow Speed, BFFS			mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		2012	pc/h/ln	v_p																						
S		61.2	mi/h	S																						
$D = v_p / S$		32.9	pc/mi/ln	$D = v_p / S$																						
LOS		D		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																					
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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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
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Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6500		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
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)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
<u>Operational (LOS)</u>			<u>Design (N)</u>																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1923		pc/h/ln																						
S		62.6		mi/h																						
$D = v_p / S$		30.7		pc/mi/ln																						
LOS		D																								
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																										
			<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		LML		Highway/Direction of Travel																						
Agency or Company		Fehr & Peers		From/To																						
Date Performed		5/20/2008		Jurisdiction																						
Analysis Time Period		AM Peak Hour		Analysis Year																						
Project Description Mitchell Ranch WC07-2467																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		4100		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				%																						
Peak-Hr Direction Prop, D				%																						
DDHV = AADT x K x D				veh/h																						
Driver type adjustment		1.00																								
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.939																						
Speed Inputs			Calc Speed Adj and FFS																							
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)		65.0		mi/h																						
Base free-flow Speed, BFFS				mi/h																						
				FFS																						
				65.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
1213			pc/h/ln																							
S			S																							
65.0			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
18.7			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																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				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																						

APPENDIX E: FREEWAY RAMP JUNCTION ANALYSIS WORKSHEETS

Existing

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4500	0.90	Level	13	0	0.939	1.00	5325	
Ramp	629	0.90	Level	13	0	0.939	1.00	744	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.593 using Equation (Exhibit 25-12) $V_{12} =$ 3459 pc/h V_3 or V_{av34} 1866 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	5325	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	4581	Exhibit 25-14	7050	No	
				V_R	744	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3459	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 29.5 (pc/mi/ln) LOS = D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.495 (Exhibit 25-19) $S_R =$ 53.6 mph (Exhibit 25-19) $S_0 =$ 67.9 mph (Exhibit 25-19) $S =$ 57.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Fehr & Peers		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Caltrans District 10		Junction		Mitchell Road Off-Ramp			
Date Performed		12/11/2007		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{up} = ft V _u = veh/h			Terrain: Level S_{FF} = 65.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L _A , L _D , V _R , V _I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{down} = ft V _D = veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF × f _{HV} × f _p	
Freeway	3600	0.90	Level	13	0	0.939	1.00	4260	
Ramp	811	0.90	Level	13	0	0.939	1.00	960	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 25-2 or 25-3) P _{FM} = using Equation (Exhibit 25-5) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 25-8 or 25-9) P _{FD} = 0.609 using Equation (Exhibit 25-12) V ₁₂ = 2971 pc/h V ₃ or V _{av34} = 1289 pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☒ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☒ No If Yes, V _{12a} = pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 25-7			V _F	4260	Exhibit 25-14	7050	No
				V _{FO} = V _F - V _R	3300	Exhibit 25-14	7050	No	
				V _R	960	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 25-7			V ₁₂	2971	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = 25.3 (pc/mi/ln) LOS = C (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = (Exhibit 25-19) S _R = mph (Exhibit 25-19) S ₀ = mph (Exhibit 25-19) S = mph (Exhibit 25-14)					D _S = 0.514 (Exhibit 25-19) S _R = 53.2 mph (Exhibit 25-19) S ₀ = 70.2 mph (Exhibit 25-19) S = 57.4 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Fehr & Peers		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Caltrans District 10		Junction		NB Mitchell On			
Date Performed		12/11/2007		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3871	0.90	Level	13	0	0.939	1.00	4581	
Ramp	381	0.90	Level	13	0	0.939	1.00	451	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2710 pc/h V_3 or V_{av34} 1871 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	5032	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3161	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 26.8 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.378 (Exhibit 25-19) $S_R =$ 56.3 mph (Exhibit 25-19) $S_0 =$ 60.1 mph (Exhibit 25-19) $S =$ 57.6 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Fehr & Peers		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Caltrans District 10		Junction		NB Mitchell On			
Date Performed		12/11/2007		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	2789	0.90	Level	13	0	0.939	1.00	3300	
Ramp	302	0.90	Level	13	0	0.939	1.00	357	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 1952$ pc/h V_3 or $V_{av34} = 1348$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	3657	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2309	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 20.2$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.325$ (Exhibit 25-19) $S_R = 57.5$ mph (Exhibit 25-19) $S_0 = 61.9$ mph (Exhibit 25-19) $S = 59.1$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Fehr & Peers		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Caltrans District 10		Junction		Mitchell Road Off-Ramp			
Date Performed		12/11/2007		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{up} = ft V _u = veh/h			Terrain: Level S_{FF} = 65.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L _A , L _D , V _R , V _I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{down} = ft V _D = veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	3281	0.90	Level	13	0	0.939	1.00	3883	
Ramp	183	0.90	Level	13	0	0.939	1.00	217	
UpStream									
DownStream									
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 25-2 or 25-3) P _{FM} = using Equation (Exhibit 25-5) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 25-8 or 25-9) P _{FD} = 0.653 using Equation (Exhibit 25-12) V ₁₂ = 2611 pc/h V ₃ or V _{av34} = 1272 pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☒ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☒ No If Yes, V _{12a} = pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 25-7			V _F	3883	Exhibit 25-14	7050	No
				V _{FO} = V _F - V _R	3666	Exhibit 25-14	7050	No	
				V _R	217	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 25-7			V ₁₂	2611	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = 22.2 (pc/mi/ln) LOS = C (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = (Exhibit 25-19) S _R = mph (Exhibit 25-19) S ₀ = mph (Exhibit 25-19) S = mph (Exhibit 25-14)					D _S = 0.448 (Exhibit 25-19) S _R = 54.7 mph (Exhibit 25-19) S ₀ = 70.2 mph (Exhibit 25-19) S = 59.0 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Fehr & Peers		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Caltrans District 10		Junction		Mitchell Road Off-Ramp			
Date Performed		12/11/2007		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4374	0.90	Level	13	0	0.939	1.00	5176	
Ramp	263	0.90	Level	13	0	0.939	1.00	311	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.616 using Equation (Exhibit 25-12) $V_{12} =$ 3309 pc/h V_3 or V_{av34} 1867 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	5176	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	4865	Exhibit 25-14	7050	No	
				V_R	311	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3309	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 28.2 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.456 (Exhibit 25-19) $S_R =$ 54.5 mph (Exhibit 25-19) $S_0 =$ 67.9 mph (Exhibit 25-19) $S =$ 58.7 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Fehr & Peers		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Caltrans District 10		Junction		SB Mitchell On			
Date Performed		12/11/2007		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3098	0.90	Level	13	0	0.939	1.00	3666	
Ramp	942	0.90	Level	13	0	0.939	1.00	1115	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2168 pc/h V_3 or $V_{av34} =$ 1498 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4781	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3283	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 27.4 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.390 (Exhibit 25-19) $S_R =$ 56.0 mph (Exhibit 25-19) $S_0 =$ 61.4 mph (Exhibit 25-19) $S =$ 57.6 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Fehr & Peers		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Caltrans District 10		Junction		SB Mitchell On			
Date Performed		12/11/2007		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4111	0.90	Level	13	0	0.939	1.00	4865	
Ramp	889	0.90	Level	13	0	0.939	1.00	1052	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2878 pc/h V_3 or $V_{av34} =$ 1987 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	5917	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3930	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 32.5 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.485 (Exhibit 25-19) $S_R =$ 53.9 mph (Exhibit 25-19) $S_0 =$ 59.6 mph (Exhibit 25-19) $S =$ 55.7 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

Existing Plus Project

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4550	0.90	Level	13	0	0.939	1.00	5384	
Ramp	708	0.90	Level	13	0	0.939	1.00	838	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.587 using Equation (Exhibit 25-12) $V_{12} =$ 3506 pc/h V_3 or V_{av34} 1878 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	5384	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	4546	Exhibit 25-14	7050	No	
				V_R	838	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3506	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 29.9 (pc/mi/ln) LOS = D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.503 (Exhibit 25-19) $S_R =$ 53.4 mph (Exhibit 25-19) $S_0 =$ 67.9 mph (Exhibit 25-19) $S =$ 57.7 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3738	0.90	Level	13	0	0.939	1.00	4423	
Ramp	1038	0.90	Level	13	0	0.939	1.00	1228	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.593 using Equation (Exhibit 25-12) $V_{12} =$ 3122 pc/h V_3 or V_{av34} 1301 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4423	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	3195	Exhibit 25-14	7050	No	
				V_R	1228	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3122	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 26.6 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.539 (Exhibit 25-19) $S_R =$ 52.6 mph (Exhibit 25-19) $S_0 =$ 70.1 mph (Exhibit 25-19) $S =$ 56.8 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3842	0.90	Level	13	0	0.939	1.00	4546	
Ramp	439	0.90	Level	13	0	0.939	1.00	519	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2689 pc/h V_3 or $V_{av34} =$ 1857 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	5065	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3208	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 27.1 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.382 (Exhibit 25-19) $S_R =$ 56.2 mph (Exhibit 25-19) $S_0 =$ 60.1 mph (Exhibit 25-19) $S =$ 57.6 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		NB Mitchell On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	2700	0.90	Level	13	0	0.939	1.00	3195	
Ramp	498	0.90	Level	13	0	0.939	1.00	589	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 1890 pc/h V_3 or V_{av34} 1305 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	3784	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2479	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 21.4 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.333 (Exhibit 25-19) $S_R =$ 57.4 mph (Exhibit 25-19) $S_0 =$ 62.1 mph (Exhibit 25-19) $S =$ 58.9 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3318	0.90	Level	13	0	0.939	1.00	3926	
Ramp	249	0.90	Level	13	0	0.939	1.00	295	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.648 using Equation (Exhibit 25-12) $V_{12} =$ 2649 pc/h V_3 or V_{av34} 1277 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	3926	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	3631	Exhibit 25-14	7050	No	
				V_R	295	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2649	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 22.5 (pc/mi/ln) LOS = C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.455 (Exhibit 25-19) $S_R =$ 54.5 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 58.8 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4476	0.90	Level	13	0	0.939	1.00	5297	
Ramp	454	0.90	Level	13	0	0.939	1.00	537	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.603 using Equation (Exhibit 25-12) $V_{12} =$ 3407 pc/h V_3 or V_{av34} 1890 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	5297	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	4760	Exhibit 25-14	7050	No	
				V_R	537	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3407	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 29.1 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.476 (Exhibit 25-19) $S_R =$ 54.0 mph (Exhibit 25-19) $S_0 =$ 67.8 mph (Exhibit 25-19) $S =$ 58.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		SB Mitchell On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3069	0.90	Level	13	0	0.939	1.00	3632	
Ramp	1011	0.90	Level	13	0	0.939	1.00	1196	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 2148$ pc/h V_3 or $V_{av34} = 1484$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4828	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3344	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 27.9$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.396$ (Exhibit 25-19) $S_R = 55.9$ mph (Exhibit 25-19) $S_0 = 61.5$ mph (Exhibit 25-19) $S = 57.5$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		SB Mitchell On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Existing + Project Conditions			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4022	0.90	Level	13	0	0.939	1.00	4759	
Ramp	1123	0.90	Level	13	0	0.939	1.00	1329	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2815 pc/h V_3 or $V_{av34} =$ 1944 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6088	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	4144	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 34.1 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.532 (Exhibit 25-19) $S_R =$ 52.8 mph (Exhibit 25-19) $S_0 =$ 59.8 mph (Exhibit 25-19) $S =$ 54.8 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

Cumulative

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5861	0.90	Level	13	0	0.939	1.00	6936	
Ramp	652	0.90	Level	13	0	0.939	1.00	772	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.551 using Equation (Exhibit 25-12) $V_{12} =$ 4169 pc/h V_3 or V_{av34} 2767 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 4236 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6936	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	6164	Exhibit 25-14	7050	No	
				V_R	772	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4169	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 36.2 (pc/mi/ln) LOS = E (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.497 (Exhibit 25-19) $S_R =$ 53.6 mph (Exhibit 25-19) $S_0 =$ 64.7 mph (Exhibit 25-19) $S =$ 57.4 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3692	0.90	Level	13	0	0.939	1.00	4369	
Ramp	433	0.90	Level	13	0	0.939	1.00	512	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.627 using Equation (Exhibit 25-12) $V_{12} =$ 2931 pc/h V_3 or V_{av34} 1438 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4369	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	3857	Exhibit 25-14	7050	No	
				V_R	512	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2931	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 25.0 (pc/mi/ln) LOS = C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.474 (Exhibit 25-19) $S_R =$ 54.1 mph (Exhibit 25-19) $S_0 =$ 69.6 mph (Exhibit 25-19) $S =$ 58.4 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5209	0.90	Level	13	0	0.939	1.00	6164	
Ramp	578	0.90	Level	13	0	0.939	1.00	684	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 3646 pc/h V_3 or V_{av34} 2518 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6848	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	4330	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 35.8 (pc/mi/ln) $LOS =$ E (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.582 (Exhibit 25-19) $S_R =$ 51.6 mph (Exhibit 25-19) $S_0 =$ 57.2 mph (Exhibit 25-19) $S =$ 53.5 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} =$ 65.0 mph $S_{FR} =$ 35.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3259	0.90	Level	13	0	0.939	1.00	3856	
Ramp	241	0.90	Level	13	0	0.939	1.00	285	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2281 pc/h V_3 or $V_{av34} =$ 1575 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4141	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2566	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 22.2 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.337 (Exhibit 25-19) $S_R =$ 57.3 mph (Exhibit 25-19) $S_0 =$ 61.1 mph (Exhibit 25-19) $S =$ 58.7 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3349	0.90	Level	13	0	0.939	1.00	3963	
Ramp	190	0.90	Level	13	0	0.939	1.00	225	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.651 using Equation (Exhibit 25-12) $V_{12} =$ 2657 pc/h V_3 or V_{av34} 1306 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	3963	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	3738	Exhibit 25-14	7050	No	
				V_R	225	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2657	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 22.6 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.448 (Exhibit 25-19) $S_R =$ 54.7 mph (Exhibit 25-19) $S_0 =$ 70.1 mph (Exhibit 25-19) $S =$ 59.0 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6687	0.90	Level	13	0	0.939	1.00	7913	
Ramp	738	0.90	Level	13	0	0.939	1.00	873	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.522 using Equation (Exhibit 25-12) $V_{12} =$ 4548 pc/h V_3 or V_{av34} 3365 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 5213 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7913	Exhibit 25-14	7050	Yes
				$V_{FO} = V_F - V_R$	7040	Exhibit 25-14	7050	No	
				V_R	873	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4548	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 44.6 (pc/mi/ln) LOS = F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.507 (Exhibit 25-19) $S_R =$ 53.3 mph (Exhibit 25-19) $S_0 =$ 64.7 mph (Exhibit 25-19) $S =$ 56.7 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3159	0.90	Level	13	0	0.939	1.00	3738	
Ramp	899	0.90	Level	13	0	0.939	1.00	1064	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 2211$ pc/h V_3 or $V_{av34} = 1527$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4802	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3275	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 27.4$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.389$ (Exhibit 25-19) $S_R = 56.1$ mph (Exhibit 25-19) $S_0 = 61.3$ mph (Exhibit 25-19) $S = 57.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		SB Mitchell On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative No Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5949	0.90	Level	13	0	0.939	1.00	7040	
Ramp	437	0.90	Level	13	0	0.939	1.00	517	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 4164 pc/h V_3 or $V_{av34} =$ 2876 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 4340 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7557	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	4857	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 40.0 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.788 (Exhibit 25-19) $S_R =$ 46.9 mph (Exhibit 25-19) $S_0 =$ 56.1 mph (Exhibit 25-19) $S =$ 49.8 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

Cumulative Plus Project

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5900	0.90	Level	13	0	0.939	1.00	6982	
Ramp	720	0.90	Level	13	0	0.939	1.00	852	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.546 using Equation (Exhibit 25-12) $V_{12} =$ 4201 pc/h V_3 or V_{av34} 2781 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 4282 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6982	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	6130	Exhibit 25-14	7050	No	
				V_R	852	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4201	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 36.6 (pc/mi/ln) $LOS =$ E (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.505 (Exhibit 25-19) $S_R =$ 53.4 mph (Exhibit 25-19) $S_0 =$ 64.7 mph (Exhibit 25-19) $S =$ 57.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3800	0.90	Level	13	0	0.939	1.00	4497	
Ramp	630	0.90	Level	13	0	0.939	1.00	746	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.613 using Equation (Exhibit 25-12) $V_{12} =$ 3046 pc/h V_3 or V_{av34} 1451 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4497	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	3751	Exhibit 25-14	7050	No	
				V_R	746	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3046	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 25.9 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.495 (Exhibit 25-19) $S_R =$ 53.6 mph (Exhibit 25-19) $S_0 =$ 69.5 mph (Exhibit 25-19) $S =$ 57.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5180	0.90	Level	13	0	0.939	1.00	6130	
Ramp	640	0.90	Level	13	0	0.939	1.00	757	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 3626 pc/h V_3 or $V_{av34} =$ 2504 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6887	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	4383	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 36.2 (pc/mi/ln) $LOS =$ E (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.598 (Exhibit 25-19) $S_R =$ 51.2 mph (Exhibit 25-19) $S_0 =$ 57.2 mph (Exhibit 25-19) $S =$ 53.3 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} =$ 65.0 mph $S_{FR} =$ 35.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3170	0.90	Level	13	0	0.939	1.00	3751	
Ramp	450	0.90	Level	13	0	0.939	1.00	533	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2219 pc/h V_3 or $V_{av34} =$ 1532 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4284	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2752	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 23.6 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.347 (Exhibit 25-19) $S_R =$ 57.0 mph (Exhibit 25-19) $S_0 =$ 61.3 mph (Exhibit 25-19) $S =$ 58.5 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3380	0.90	Level	13	0	0.939	1.00	4000	
Ramp	250	0.90	Level	13	0	0.939	1.00	296	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.646 using Equation (Exhibit 25-12) $V_{12} =$ 2690 pc/h V_3 or V_{av34} 1310 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4000	Exhibit 25-14	7050	No
				$V_{FO} = V_F - V_R$	3704	Exhibit 25-14	7050	No	
				V_R	296	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2690	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 22.9 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.455 (Exhibit 25-19) $S_R =$ 54.5 mph (Exhibit 25-19) $S_0 =$ 70.1 mph (Exhibit 25-19) $S =$ 58.8 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6800	0.90	Level	13	0	0.939	1.00	8047	
Ramp	940	0.90	Level	13	0	0.939	1.00	1112	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.508 using Equation (Exhibit 25-12) $V_{12} =$ 4633 pc/h V_3 or V_{av34} 3414 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 5347 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8047	Exhibit 25-14	7050	Yes
				$V_{FO} = V_F - V_R$	6935	Exhibit 25-14	7050	No	
				V_R	1112	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4633	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 45.7 (pc/mi/ln) LOS = F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.528 (Exhibit 25-19) $S_R =$ 52.9 mph (Exhibit 25-19) $S_0 =$ 64.7 mph (Exhibit 25-19) $S =$ 56.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3130	0.90	Level	13	0	0.939	1.00	3704	
Ramp	970	0.90	Level	13	0	0.939	1.00	1148	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 2191 pc/h V_3 or $V_{av34} =$ 1513 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4852	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3339	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 27.9 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.396 (Exhibit 25-19) $S_R =$ 55.9 mph (Exhibit 25-19) $S_0 =$ 61.4 mph (Exhibit 25-19) $S =$ 57.5 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		SB Mitchell On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5860	0.90	Level	13	0	0.939	1.00	6934	
Ramp	640	0.90	Level	13	0	0.939	1.00	757	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 4101 pc/h V_3 or $V_{av34} =$ 2833 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 4234 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7691	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	4991	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 40.9 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.860 (Exhibit 25-19) $S_R =$ 45.2 mph (Exhibit 25-19) $S_0 =$ 56.1 mph (Exhibit 25-19) $S =$ 48.5 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

Mitigation

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5900	0.90	Level	13	0	0.939	1.00	6982	
Ramp	720	0.90	Level	13	0	0.939	1.00	852	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 3525 pc/h V_3 or V_{av34} 1728 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6982	Exhibit 25-14	9400	No
				$V_{FO} = V_F - V_R$	6130	Exhibit 25-14	9400	No	
				V_R	852	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3525	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 30.1 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.505 (Exhibit 25-19) $S_R =$ 53.4 mph (Exhibit 25-19) $S_0 =$ 68.5 mph (Exhibit 25-19) $S =$ 59.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Road Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3800	0.90	Level	13	0	0.939	1.00	4497	
Ramp	630	0.90	Level	13	0	0.939	1.00	746	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 2381 pc/h V_3 or V_{av34} 1058 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4497	Exhibit 25-14	9400	No
				$V_{FO} = V_F - V_R$	3751	Exhibit 25-14	9400	No	
				V_R	746	Exhibit 25-3	2000	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2381	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 20.2 (pc/mi/ln) LOS = C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.495 (Exhibit 25-19) $S_R =$ 53.6 mph (Exhibit 25-19) $S_0 =$ 71.1 mph (Exhibit 25-19) $S =$ 60.6 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5180	0.90	Level	13	0	0.939	1.00	6130	
Ramp	640	0.90	Level	13	0	0.939	1.00	757	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.282 using Equation (Exhibit 25-5) $V_{12} =$ 1731 pc/h V_3 or $V_{av34} =$ 2199 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 2452 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6887	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3209	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 27.0 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.383 (Exhibit 25-19) $S_R =$ 56.2 mph (Exhibit 25-19) $S_0 =$ 60.2 mph (Exhibit 25-19) $S =$ 58.3 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		NB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3170	0.90	Level	13	0	0.939	1.00	3751	
Ramp	450	0.90	Level	13	0	0.939	1.00	533	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.310 using Equation (Exhibit 25-5) $V_{12} =$ 1165 pc/h V_3 or V_{av34} 1293 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 1500 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4284	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2033	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 18.0 (pc/mi/ln) $LOS =$ B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.316 (Exhibit 25-19) $S_R =$ 57.7 mph (Exhibit 25-19) $S_0 =$ 62.8 mph (Exhibit 25-19) $S =$ 60.3 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3380	0.90	Level	13	0	0.939	1.00	4000	
Ramp	250	0.90	Level	13	0	0.939	1.00	296	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.260 using Equation (Exhibit 25-12) $V_{12} =$ 1259 pc/h V_3 or V_{av34} 1370 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 1600 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4000	Exhibit 25-14	9400	No
				$V_{FO} = V_F - V_R$	3704	Exhibit 25-14	9400	No	
				V_R	296	Exhibit 25-3	3800	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1259	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 4.5 (pc/mi/ln) LOS = A (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.455 (Exhibit 25-19) $S_R =$ 54.5 mph (Exhibit 25-19) $S_0 =$ 70.5 mph (Exhibit 25-19) $S =$ 63.1 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd Off-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{up} = ft V _u = veh/h			Terrain: Level S_{FF} = 65.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L _A , L _D , V _R , V _I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{down} = ft V _D = veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	6800	0.90	Level	13	0	0.939	1.00	8047	
Ramp	940	0.90	Level	13	0	0.939	1.00	1112	
UpStream									
DownStream									
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 25-2 or 25-3) P _{FM} = using Equation (Exhibit 25-5) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 25-8 or 25-9) P _{FD} = 0.260 using Equation (Exhibit 25-12) V ₁₂ = 2915 pc/h V ₃ or V _{av34} = 2566 pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☒ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☒ Yes ☐ No If Yes, V _{12a} = 3218 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 25-7			V _F	8047	Exhibit 25-14	9400	No
				V _{FO} = V _F - V _R	6935	Exhibit 25-14	9400	No	
				V _R	1112	Exhibit 25-3	3800	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 25-7			V ₁₂	2915	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = 18.4 (pc/mi/ln) LOS = B (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = (Exhibit 25-19) S _R = mph (Exhibit 25-19) S ₀ = mph (Exhibit 25-19) S = mph (Exhibit 25-14)					D _S = 0.528 (Exhibit 25-19) S _R = 52.9 mph (Exhibit 25-19) S ₀ = 65.8 mph (Exhibit 25-19) S = 59.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		Mitchell Rd On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		AM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3130	0.90	Level	13	0	0.939	1.00	3704	
Ramp	970	0.90	Level	13	0	0.939	1.00	1148	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.234 using Equation (Exhibit 25-5) $V_{12} =$ 865 pc/h V_3 or V_{av34} 1419 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 1481 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4852	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2629	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 22.3 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.340 (Exhibit 25-19) $S_R =$ 57.2 mph (Exhibit 25-19) $S_0 =$ 62.8 mph (Exhibit 25-19) $S =$ 59.6 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LML		Freeway/Dir of Travel		SB State Route 99			
Agency or Company		Fehr & Peers		Junction		SB Mitchell On-Ramp			
Date Performed		5/20/2008		Jurisdiction		Caltrans District 10			
Analysis Time Period		PM Peak Hour		Analysis Year		Cumulative Plus Project + Mit			
Project Description Mitchell Ranch WC07-2467									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 65.0$ mph $S_{FR} = 35.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5860	0.90	Level	13	0	0.939	1.00	6934	
Ramp	640	0.90	Level	13	0	0.939	1.00	757	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.282 using Equation (Exhibit 25-5) $V_{12} =$ 1959 pc/h V_3 or $V_{av34} =$ 2487 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 2773 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7691	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3530	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 29.5 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.419 (Exhibit 25-19) $S_R =$ 55.4 mph (Exhibit 25-19) $S_0 =$ 59.3 mph (Exhibit 25-19) $S =$ 57.4 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				