

APPENDIX I

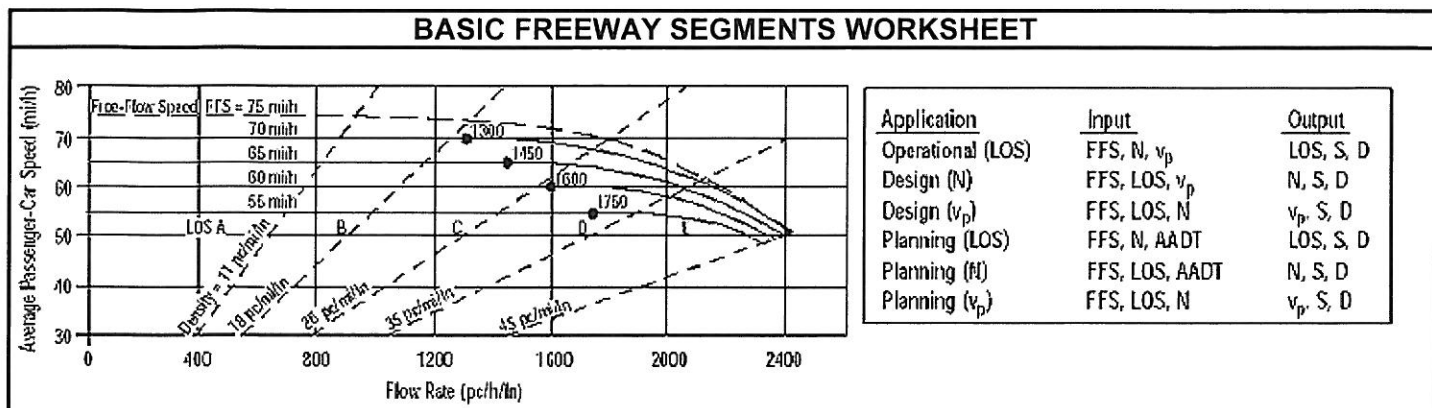
Design Year (2039) I-75 Merge/Diverge Area HCS Analysis Summary Sheets

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	AL				Freeway/Dir of Travel	I-75 EB				
Agency or Company	AIM ENGINEERING				Junction	SR 29 OFF RAMP				
Date Performed	3/8/2012				Jurisdiction					
Analysis Time Period	AM				Analysis Year	2039 NO-BUILD				
Project Description										
Inputs										
Upstream Adj Ramp		Number of Lanes, N			2 ✓			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A						<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D			202			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Freeway Volume, V _F			2039 ✓			L _{down} = ft		
V _u = veh/h		Ramp Volume, V _R			693 ✓			V _D = veh/h		
		Freeway Free-Flow Speed, S _{FF}			70.0 ✓					
		Ramp Free-Flow Speed, S _{FR}			45.0 ✓					
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	2039	0.95 ✓	Level	6	0	0.971	0.90 ✓	2456		
Ramp	693	0.95 ✓	Level	22	0	0.901	0.90 ✓	900		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v ₁₂					Estimation of v ₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 2456 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}		Exhibit 13-8			V _F	2456	Exhibit 13-8	4800	No	
			V _{FO} = V _F - V _R	1556	Exhibit 13-8	4800	No			
			V _R	900	Exhibit 13-10	2100	No			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}		Exhibit 13-8			V ₁₂	2456	Exhibit 13-8		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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 23.6 (pc/mi/ln) LOS = C (Exhibit 13-2)					

RAMPS AND RAMP JUNCTIONS WORKSHEET											
General Information					Site Information						
Analyst	AL		Freeway/Dir of Travel	I-75 EB		Agency or Company		AIM ENGINEERING			
Date Performed	3/16/2012		Jurisdiction			Junction		SR 29 EB ON			
Analysis Time Period	AM		Analysis Year	2039 NO-BUILD							
Project Description											
Inputs											
Upstream Adj Ramp		Number of Lanes, N		2 ✓		Downstream Adj Ramp					
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A		560		<input type="checkbox"/> Yes <input type="checkbox"/> On					
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D				<input checked="" type="checkbox"/> No <input type="checkbox"/> Off					
L _{up} =	ft		Freeway Volume, V _F		1346 ✓		L _{down} =		ft		
V _u =	veh/h		Ramp Volume, V _R		319 ✓		V _D =		veh/h		
		Freeway Free-Flow Speed, S _{FF}		70.0 ✓							
		Ramp Free-Flow Speed, S _{FR}		35.0							
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	1346	0.95 ✓	Level	6	0	0.971	0.90 ✓	1621			
Ramp	319	0.95 ✓	Level	22	0	0.901	0.90 ✓	414			
UpStream											
DownStream											
Merge Areas					Diverge Areas						
Estimation of v ₁₂					Estimation of v ₁₂						
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1621 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)						
Capacity Checks					Capacity Checks						
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?		
V _{FO}	2035	Exhibit 13-8		No	V _F		Exhibit 13-8				
					V _{FO} = V _F - V _R		Exhibit 13-8				
					V _R		Exhibit 13-10				
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area						
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?		
V _{R12}	2035	Exhibit 13-8		No	V ₁₂		Exhibit 13-8				
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 = 17.6 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)						

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 WB						
Agency or Company	AIM ENGINEERING	Junction	SR 29 OFF RAMP						
Date Performed	3/8/2012	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp	Number of Lanes, N		2 ✓		Downstream Adj Ramp				
<input type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L _A				<input type="checkbox"/> Yes <input type="checkbox"/> On				
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Deceleration Lane Length L _D		215		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off				
L _{up} = ft	Freeway Volume, V _F		2119 ✓		L _{down} = ft				
V _u = veh/h	Ramp Volume, V _R		406 ✓		V _D = veh/h				
	Freeway Free-Flow Speed, S _{FF}		70.0 ✓						
	Ramp Free-Flow Speed, S _{FR}		45.0 ✓						
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	2119	0.95 ✓	Level	6	0	0.971	0.90 ✓	2553	
Ramp	406	0.95	Level	22	0	0.901	0.90 ✓	527	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 2553 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	2553	Exhibit 13-8	4800	No
					V _{FO} = V _F - V _R	2026	Exhibit 13-8	4800	No
					V _R	527	Exhibit 13-10	2100	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	2553	Exhibit 13-8	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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 24.3 (pc/mi/ln) LOS = C (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	AL				Freeway/Dir of Travel	I-75 WB				
Agency or Company	AIM ENGINEERING				Junction	SR 29 WB ON				
Date Performed	3/16/2012				Jurisdiction					
Analysis Time Period	AM				Analysis Year	2039 NO-BUILD				
Project Description										
Inputs										
Upstream Adj Ramp	Number of Lanes, N				2 ✓		Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L _A				415		<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Deceleration Lane Length L _D						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L _{up} = ft	Freeway Volume, V _F				1713 ✓		L _{down} = ft			
V _u = veh/h	Ramp Volume, V _R				882 ✓		V _D = veh/h			
	Freeway Free-Flow Speed, S _{FF}				70.0 ✓					
	Ramp Free-Flow Speed, S _{FR}				35.0					
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	1713	0.95 ✓	Level	6	0	0.971	0.90 ✓	2064		
Ramp	882	0.95 ✓	Level	22	0	0.901	0.90	1145		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v₁₂					Estimation of v₁₂					
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 2064 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}	3209	Exhibit 13-8		No	V _F		Exhibit 13-8			
					V _{FO} = V _F - V _R		Exhibit 13-8			
					V _R		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}	3209	Exhibit 13-8		No	V ₁₂		Exhibit 13-8			
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 13-2)					$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					



General Information		Site Information	
Analyst	GSR	Highway/Direction of Travel	I-75 EB
Agency or Company	AIM ENGINEERING	From/To	GG PKWY/CR 951
Date Performed	4/22/2012	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD

Project Description EVERGLADES IJR

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

Flow Inputs

Volume, V	4090	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P_T	6
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

Calculate Flow Adjustments

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

Speed Inputs		Calc Speed Adj and FFS			
Lane Width	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	0.50	l/mi	f_{ID}	0.0	mi/h
Number of Lanes, N	3		f_N	3.0	mi/h
FFS (measured)		mi/h	FFS	72.0	mi/h
Base free-flow Speed, BFFS	75.0	mi/h			

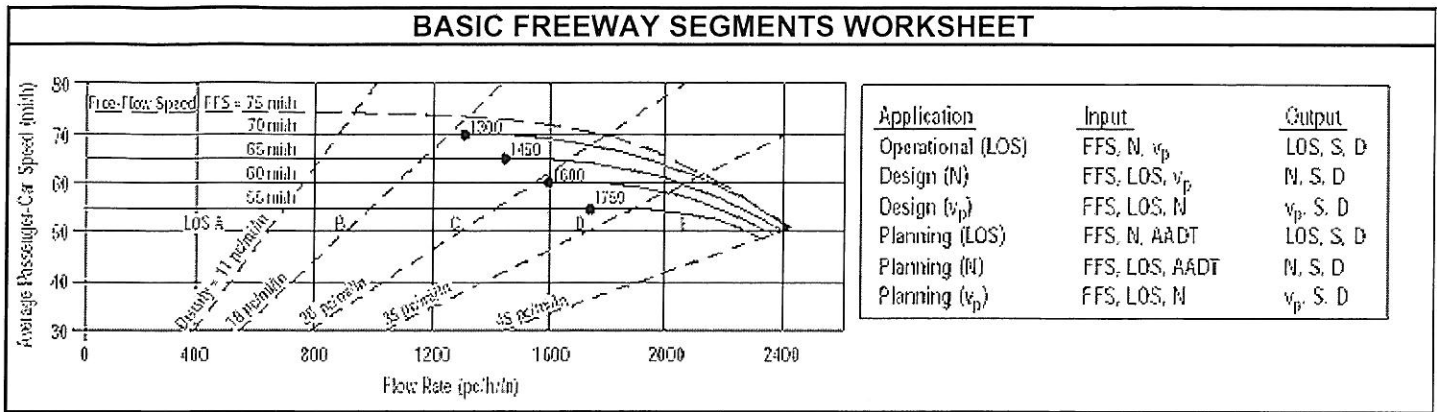
LOS and Performance Measures	Design (N)
Operational (LOS)	Design (N)
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	Design LOS
S	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$
$D = v_p / S$	S
LOS	$D = v_p / S$
	Required Number of Lanes, N

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	

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	GSR	Highway/Direction of Travel	I-75																					
Agency or Company	AIM ENGINEERING	From/To	BTWN EB CR 951 ON-/OFF-RAMPS																					
Date Performed	3/25/2012	Jurisdiction																						
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD																					
Project Description EVERGLADES IJR																								
<input type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data																								
Flow Inputs																								
Volume, V	1797	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	0.90		Up/Down %																					
Calculate Flow Adjustments																								
f_p	0.90	E_R	1.2																					
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.971																					
Speed Inputs		Calc Speed Adj and FFS																						
Lane Width	12.0	ft	f_{LW}																					
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}																					
Interchange Density	0.50	l/mi	f_{ID}																					
Number of Lanes, N	2		f_N																					
FFS (measured)		mi/h	FFS																					
Base free-flow Speed, BFFS	75.0	mi/h																						
LOS and Performance Measures		Design (N)																						
<u>Operational (LOS)</u>		<u>Design (N)</u>																						
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1082	pc/h/ln	Design LOS																					
S	70.5	mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																					
$D = v_p / S$	15.3	pc/mi/ln	S																					
LOS	B		$D = v_p / S$																					
			Required Number of Lanes, N																					
Glossary		Factor Location																						
N - Number of lanes	S - Speed	E_R - Exhibits 23-8, 23-10	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																								

RAMPS AND RAMP JUNCTIONS WORKSHEET											
General Information					Site Information						
Analyst	AL				Freeway/Dir of Travel	I-75 EB					
Agency or Company	AIM ENGINEERING				Junction	SR 951 EB ON					
Date Performed	3/16/2012				Jurisdiction						
Analysis Time Period	AM				Analysis Year	2039 NO-BUILD					
Project Description											
Inputs											
Upstream Adj Ramp		Number of Lanes, N			2			Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A			465			<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L _{up} =	ft		Freeway Volume, V _F			1797			L _{down} =	ft	
V _u =	veh/h		Ramp Volume, V _R			242			V _D =	veh/h	
			Freeway Free-Flow Speed, S _{FF}			70.0					
			Ramp Free-Flow Speed, S _{FR}			35.0					
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	1797	0.95	Level	6	0	0.971	0.90	2165			
Ramp	242	0.95	Level	6	0	0.971	0.90	292			
UpStream											
DownStream											
Merge Areas					Diverge Areas						
Estimation of v₁₂					Estimation of v₁₂						
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 2165 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)						
Capacity Checks					Capacity Checks						
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?		
V _{FO}	2457	Exhibit 13-8		No	V _F		Exhibit 13-8				
					V _{FO} = V _F - V _R		Exhibit 13-8				
					V _R		Exhibit 13-10				
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area						
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?		
V _{R12}	2457	Exhibit 13-8		No	V ₁₂		Exhibit 13-8				
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 = 21.6 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)						

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	AL	Freeway/Dir of Travel	I-75 WB							
Agency or Company	AIM ENGINEERING	Junction	SR 951 OFF RAMP							
Date Performed	3/8/2012	Jurisdiction								
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD							
Project Description										
Inputs										
Upstream Adj Ramp		Number of Lanes, N		2		Downstream Adj Ramp				
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A				<input type="checkbox"/> Yes <input type="checkbox"/> On				
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D		220		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off				
L _{up} = ft		Freeway Volume, V _F		2595		L _{down} = ft				
V _u = veh/h		Ramp Volume, V _R		308		V _D = veh/h				
		Freeway Free-Flow Speed, S _{FF}		70.0						
		Ramp Free-Flow Speed, S _{FR}		45.0						
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	2595	0.95	Level	6	0	0.971	0.90	3126		
Ramp	308	0.95	Level	6	0	0.971	0.90	371		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v ₁₂					Estimation of v ₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 3126 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}		Exhibit 13-8			V _F	3126	Exhibit 13-8	4800	No	
					V _{FO} = V _F - V _R	2755	Exhibit 13-8	4800	No	
					V _R	371	Exhibit 13-10	2100	No	
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}		Exhibit 13-8			V ₁₂	3126	Exhibit 13-8		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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 29.2 (pc/mi/ln) LOS = D (Exhibit 13-2)					



General Information		Site Information	
Analyst	GSR	Highway/Direction of Travel	I-75
Agency or Company	AIM ENGINEERING	From/To	BTWN WB CR 951 ON/OFF-RAMPS
Date Performed	3/25/2012	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD

Project Description **EVERGLADES IJR**

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

Flow Inputs

Volume, V	2287	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P_T	6
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	0.90		Up/Down %	

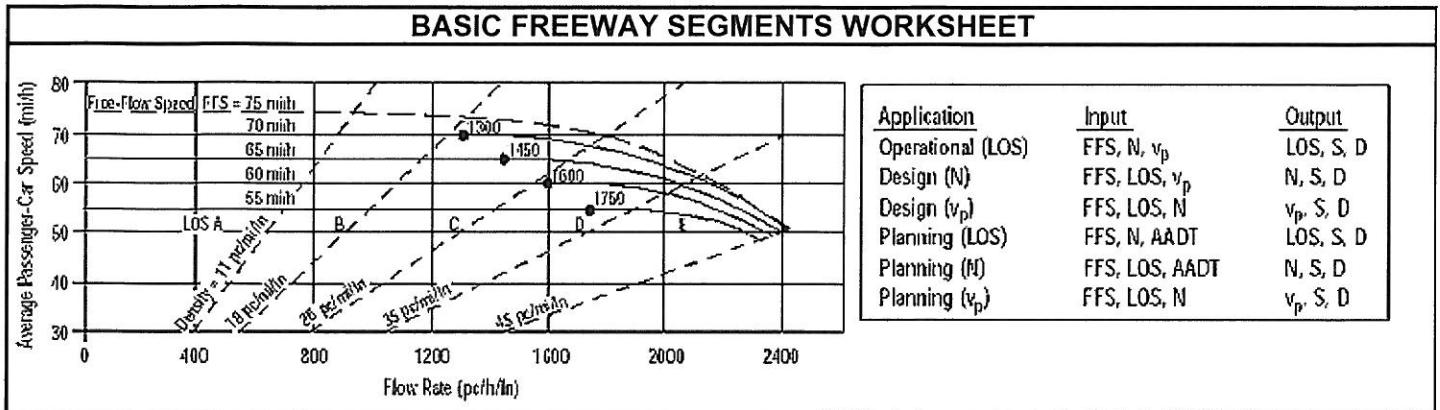
Calculate Flow Adjustments

f_p	0.90	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.971

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	f_{LW}	0.0 mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	f_{LC}	0.0 mi/h
Interchange Density	0.50 l/mi	f_{ID}	0.0 mi/h
Number of Lanes, N	2	f_N	4.5 mi/h
FFS (measured)		FFS	70.5 mi/h
Base free-flow Speed, BFFS	75.0 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
S	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$
D = v_p / S	S
LOS	D = v_p / S
	Required Number of Lanes, N

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	



General Information		Site Information	
Analyst	GSR	Highway/Direction of Travel	I-75 WB
Agency or Company	AIM ENGINEERING	From/To	CR 951/GG PKWY
Date Performed	4/22/2012	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD

Project Description EVERGLADES IJR

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

Flow Inputs

Volume, V	5206	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	% Trucks and Buses, P_T	6
Peak-Hr Prop. of AADT, K			% RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

Calculate Flow Adjustments

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

Speed Inputs		Calc Speed Adj and FFS			
Lane Width	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	0.50	l/mi	f_{ID}	0.0	mi/h
Number of Lanes, N	3		f_N	3.0	mi/h
FFS (measured)		mi/h	FFS	72.0	mi/h
Base free-flow Speed, BFFS	75.0	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
S	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$
D = v_p / S	S
LOS	D = v_p / S
	Required Number of Lanes, N

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	

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 NB						
Agency or Company	AIM ENGINEERING	Junction	GGP NB OFF RAMP						
Date Performed	3/8/2012	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp		Number of Lanes, N		3 ✓		Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A				<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D		310		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L _{up} = ft		Freeway Volume, V _F		5206 ✓		L _{down} = ft			
V _u = veh/h		Ramp Volume, V _R		639 ✓		V _D = veh/h			
		Freeway Free-Flow Speed, S _{FF}		70.0 ✓					
		Ramp Free-Flow Speed, S _{FR}		45.0					
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	5206	0.95 ✓	Level	6	0	0.971	1.00 ✓	5644	
Ramp	639	0.95 ✓	Level	6	0	0.971	1.00 ✓	693	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 0.587 using Equation (Exhibit 13-7) V ₁₂ = 3599 pc/h V ₃ or V _{av34} 2045 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	5644	Exhibit 13-8	7200	No
					V _{FO} = V _F - V _R	4951	Exhibit 13-8	7200	No
					V _R	693	Exhibit 13-10	2100	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	3599	Exhibit 13-8	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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 32.4 (pc/mi/ln) LOS = D (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 NB						
Agency or Company	AIM ENGINEERING	Junction	GOLDEN GATE PKWY NB ON						
Date Performed	3/16/2012	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp	Number of Lanes, N		3 ✓		Downstream Adj Ramp				
<input type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L _A		500		<input type="checkbox"/> Yes <input type="checkbox"/> On				
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Deceleration Lane Length L _D				<input checked="" type="checkbox"/> No <input type="checkbox"/> Off				
L _{up} = ft	Freeway Volume, V _F		4567 ✓		L _{down} = ft				
V _u = veh/h	Ramp Volume, V _R		1767 ✓		V _D = veh/h				
	Freeway Free-Flow Speed, S _{FF}		70.0 ✓						
	Ramp Free-Flow Speed, S _{FR}		35.0						
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	4567	0.95 ✓	Level	6	0	0.971	1.00 ✓	4952	
Ramp	1767	0.95	Level	6	0	0.971	1.00 ✓	1916	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = 0.591 using Equation (Exhibit 13-6) V ₁₂ = 2929 pc/h V ₃ or V _{av34} = 2023 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	6868	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	4845	Exhibit 13-8 4600:All		Yes	V ₁₂		Exhibit 13-8		
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 = 39.2 (pc/mi/ln) LOS = E (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln)				

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: AL
 Agency/Co.: AIM ENGINEERING
 Date performed: 3/8/2012
 Analysis time period: AM
 Freeway/Dir of Travel: I-75 SB
 Junction: GGP SB OFF RAMP
 Jurisdiction:
 Analysis Year: 2039 NO-BUILD
 Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5958	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	2370	vph
Length of first accel/decel lane	165	ft
Length of second accel/decel lane	465	ft

Adjacent Ramp Data (if one exists)

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

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5958	2370		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1568	624		v
Trucks and buses	6	6		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5*	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.971	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6460	2570	pcph

Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)
 EQ
 P = 0.450 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P = 4320$ pc/h
 FD

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6460	7200	No
$v_{FO} = v_F - v_R$	3890	7200	No
v_R	2570	4200	No
v_3 or v_{av34}	2140 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or $v_{av34} > 2700$ pc/h?		No	
Is v_3 or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 4320$		(Equation 13-15, 13-16, 13-18, or 13-19)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4320	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 34.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D = 0.529	
Space mean speed in ramp influence area,	S = 55.2	mph
Space mean speed in outer lanes,	S = 72.3	mph
Space mean speed for all vehicles,	S = 59.9	mph

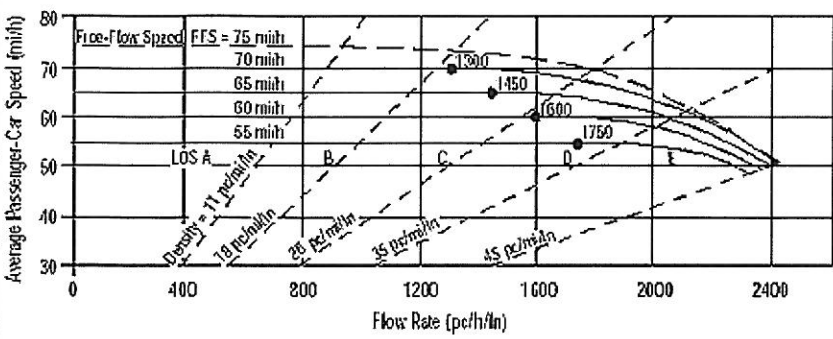
RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information				Site Information					
Analyst	AL	Freeway/Dir of Travel	I-75 SB						
Agency or Company	AIM ENGINEERING	Junction	GOLDEN GATE PKWY SB ON						
Date Performed	3/16/2012	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Number of Lanes, N Acceleration Lane Length, L _A Deceleration Lane Length L _D	3 ✓ 550 3588 ✓	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Freeway Volume, V _F Ramp Volume, V _R Freeway Free-Flow Speed, S _{FF} Ramp Free-Flow Speed, S _{FR}	550 502 ✓ 70.0 ✓ 35.0	L _{down} = ft V _D = veh/h	L _{up} = ft V _u = 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	3588	0.95 ✓	Level	6	0	0.971	1.00 ✓	3890	
Ramp	502	0.95	Level	6	0	0.971	1.00	544	
UpStream									
DownStream									
Merge Areas				Diverge Areas					
Estimation of v ₁₂				Estimation of v ₁₂					
L _{EQ} =	V ₁₂ = V _F (P _{FM}) (Equation 13-6 or 13-7)			L _{EQ} =	V ₁₂ = V _R + (V _F - V _R)P _{FD} (Equation 13-12 or 13-13)				
P _{FM} =	0.593 using Equation (Exhibit 13-6)			P _{FD} =	using Equation (Exhibit 13-7)				
V ₁₂ =	2306 pc/h			V ₁₂ =	pc/h				
V ₃ or V _{av34}	1584 pc/h (Equation 13-14 or 13-17)			V ₃ or V _{av34}	pc/h (Equation 13-14 or 13-17)				
Is V ₃ or V _{av34} > 2,700 pc/h?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Is V ₃ or V _{av34} > 2,700 pc/h?	<input type="checkbox"/> Yes <input type="checkbox"/> No				
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2	<input type="checkbox"/> Yes <input type="checkbox"/> No				
If Yes, V _{12a} =	pc/h (Equation 13-16, 13-18, or 13-19)			If Yes, V _{12a} =	pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks				Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	4434	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	2850	Exhibit 13-8 4600:All		No	V ₁₂		Exhibit 13-8		
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 = 4.252 + 0.0086 V ₁₂ - 0.009 L _D					
D _R = 24.0 (pc/mi/ln)				D _R = (pc/mi/ln)					
LOS = C (Exhibit 13-2)									

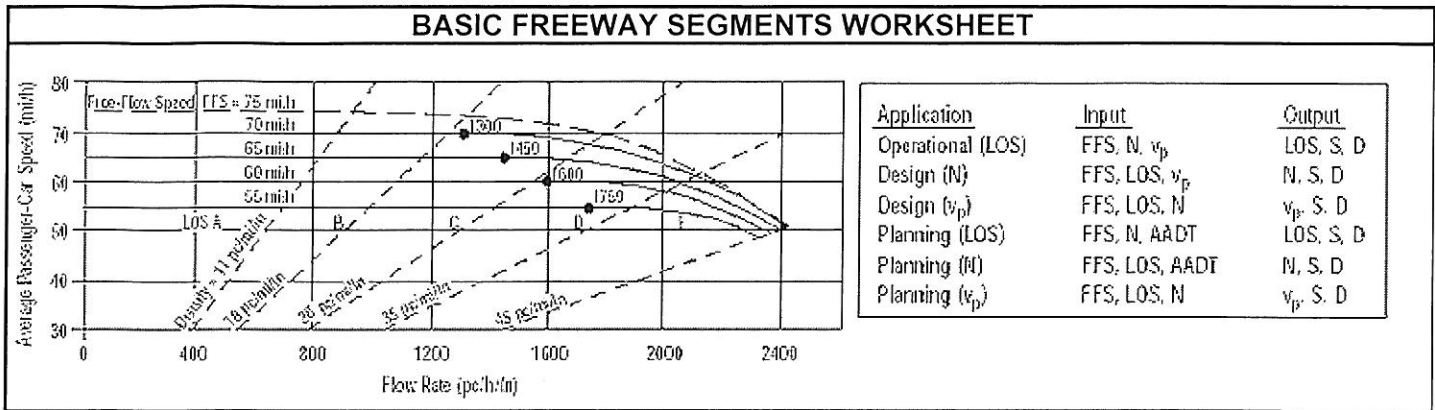
RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 EB						
Agency or Company	AIM ENGINEERING	Junction	SR 29 OFF RAMP						
Date Performed	3/8/2012	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp	Number of Lanes, N	2		Downstream Adj Ramp					
<input type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L_A			<input type="checkbox"/> Yes <input type="checkbox"/> On					
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Deceleration Lane Length L_D	202		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off					
$L_{up} =$ ft	Freeway Volume, V_F	2595		$L_{down} =$ ft					
$V_u =$ veh/h	Ramp Volume, V_R	882		$V_D =$ veh/h					
	Freeway Free-Flow Speed, S_{FF}	70.0							
	Ramp Free-Flow Speed, S_{FR}	45.0							
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	2595	0.95	Level	6	0	0.971	0.90	3126	
Ramp	882	0.95	Level	22	0	0.901	0.90	1145	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)				
$L_{EQ} =$ using Equation (Exhibit 13-6)					$L_{EQ} =$ using Equation (Exhibit 13-7)				
$P_{FM} =$ pc/h					$P_{FD} =$ 1.000				
$V_{12} =$ pc/h (Equation 13-14 or 13-17)					$V_{12} =$ 3126 pc/h				
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)					V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)				
Is V_3 or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No					Is V_3 or $V_{av34} > 2,700$ pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input type="checkbox"/> No					Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?		
V_{FO}		Exhibit 13-8		V_F	3126	Exhibit 13-8	4800	No	
				$V_{FO} = V_F - V_R$	1981	Exhibit 13-8	4800	No	
				V_R	1145	Exhibit 13-10	2100	No	
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?		
V_{R12}		Exhibit 13-8		V_{12}	3126	Exhibit 13-8	4400:All	No	
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/mi/ln)					$D_R =$ 29.3 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = D (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL				Freeway/Dir of Travel	I-75 EB			
Agency or Company	AIM ENGINEERING				Junction	SR 29 EB ON			
Date Performed	3/16/2012				Jurisdiction				
Analysis Time Period	PM				Analysis Year	2039 NO-BUILD			
Project Description									
Inputs									
Upstream Adj Ramp		Number of Lanes, N			2 ✓			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A			560			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D						<input type="checkbox"/> Yes <input type="checkbox"/> On	
L _{up} = ft		Freeway Volume, V _F			1713 ✓			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
V _u = veh/h		Ramp Volume, V _R			406 ✓			L _{down} = ft	
		Freeway Free-Flow Speed, S _{FF}			70.0 ✓			V _D = veh/h	
		Ramp Free-Flow Speed, S _{FR}			35.0				
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	1713	0.95 ✓	Level	6	0	0.971	0.90 ✓	2064	
Ramp	406	0.95	Level	22	0	0.901	0.90 ✓	527	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)				
L _{EQ} =					L _{EQ} =				
P _{FM} = 1.000 using Equation (Exhibit 13-6)					P _{FD} = using Equation (Exhibit 13-7)				
V ₁₂ = 2064 pc/h					V ₁₂ = pc/h				
V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17)					V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17)				
Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No				
If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	2591	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	2591	Exhibit 13-8 4600:All		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
D _R = 21.9 (pc/mi/ln)					D _R = (pc/mi/ln)				
LOS = C (Exhibit 13-2)					LOS = (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 WB						
Agency or Company	AIM ENGINEERING	Junction	SR 29 OFF RAMP						
Date Performed	3/8/2012	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp	Number of Lanes, N		2 ✓		Downstream Adj Ramp				
<input type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L _A				<input type="checkbox"/> Yes <input type="checkbox"/> On				
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Deceleration Lane Length L _D		215		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off				
L _{up} = ft	Freeway Volume, V _F		1665 ✓		L _{down} = ft				
V _u = veh/h	Ramp Volume, V _R		319 ✓		V _D = veh/h				
	Freeway Free-Flow Speed, S _{FF}		70.0 ✓						
	Ramp Free-Flow Speed, S _{FR}		45.0						
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	1665	0.95 ✓	Level	6	0	0.971	0.90 ✓	2006	
Ramp	319	0.95 ✓	Level	22	0	0.901	0.90	414	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = using Equation (Exhibit 13-6) P _{FM} = pc/h V ₁₂ = pc/h (Equation 13-14 or 13-17) V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = 1.000 using Equation (Exhibit 13-7) P _{FD} = 2006 pc/h V ₁₂ = 0 pc/h (Equation 13-14 or 13-17) V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	2006	Exhibit 13-8	4800	No
					V _{FO} = V _F - V _R	1592	Exhibit 13-8	4800	No
					V _R	414	Exhibit 13-10	2100	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	2006	Exhibit 13-8	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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 19.6 (pc/mi/ln) LOS = B (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL				Freeway/Dir of Travel	I-75 WB			
Agency or Company	AIM ENGINEERING				Junction	SR 29 WB ON			
Date Performed	3/16/2012				Jurisdiction				
Analysis Time Period	PM				Analysis Year	2039 NO-BUILD			
Project Description									
Inputs									
Upstream Adj Ramp		Number of Lanes, N			2 ✓			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A			415			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Freeway Volume, V _F			1346 ✓			L _{down} = ft	
V _u = veh/h		Ramp Volume, V _R			693 ✓			V _D = veh/h	
		Freeway Free-Flow Speed, S _{FF}			70.0 ✓				
		Ramp Free-Flow Speed, S _{FR}			35.0				
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	1346	0.95 ✓	Level	6	0	0.971	0.90 ✓	1621	
Ramp	693	0.95	Level	22	0	0.901	0.90 ✓	900	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1621 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	2521	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	2521	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
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 = 22.1 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				

BASIC FREEWAY SEGMENTS WORKSHEET																						
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Application</th> <th style="text-align: left;">Input</th> <th style="text-align: left;">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	GSR	Highway/Direction of Travel	I-75 EB																			
Agency or Company	AIM ENGINEERING	From/To	GG.PKWY/CR 951																			
Date Performed	4/22/2012	Jurisdiction																				
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD																			
Project Description EVERGLADES IJR																						
<input type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)																				
<input type="checkbox"/> Planning Data																						
Flow Inputs																						
Volume, V	5206	veh/h	Peak-Hour Factor, PHF																			
AADT		veh/day	%Trucks and Buses, P _T																			
Peak-Hr Prop. of AADT, K			%RVs, P _R																			
Peak-Hr Direction Prop, D			General Terrain:																			
DDHV = AADT x K x D		veh/h	Grade % Length																			
Driver type adjustment	1.00		Up/Down %																			
Calculate Flow Adjustments																						
f _p	1.00	E _R	1.2																			
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.971																			
Speed Inputs		Calc Speed Adj and FFS																				
Lane Width	12.0	ft	f _{LW}																			
Rt-Shoulder Lat. Clearance	6.0	ft	0.0																			
Interchange Density	0.50	l/mi	f _{LC}																			
Number of Lanes, N	3		0.0																			
FFS (measured)		mi/h	f _{ID}																			
Base free-flow Speed, BFFS	75.0	mi/h	0.0																			
			f _N																			
			3.0																			
			FFS																			
			72.0																			
LOS and Performance Measures		Design (N)																				
Operational (LOS)		Design (N)																				
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1881	Design LOS																				
S	68.0	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h																			
D = v _p / S	27.7	S	mi/h																			
LOS	D	D = v _p / S	pc/mi/ln																			
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																						



General Information		Site Information	
Analyst	GSR	Highway/Direction of Travel	I-75
Agency or Company	AIM ENGINEERING	From/To	BTWN EB CR 951 ON/OFF-RAMPS
Date Performed	3/25/2012	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD
Project Description EVERGLADES IJR			

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

Flow Inputs

Volume, V	2287	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P_T	6
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	0.90		Up/Down %	

Calculate Flow Adjustments

f_p	0.90	E_R	1.2
E_T	1.5	$f_{HV} = 1/(1+P_T(E_T - 1) + P_R(E_R - 1))$	0.971

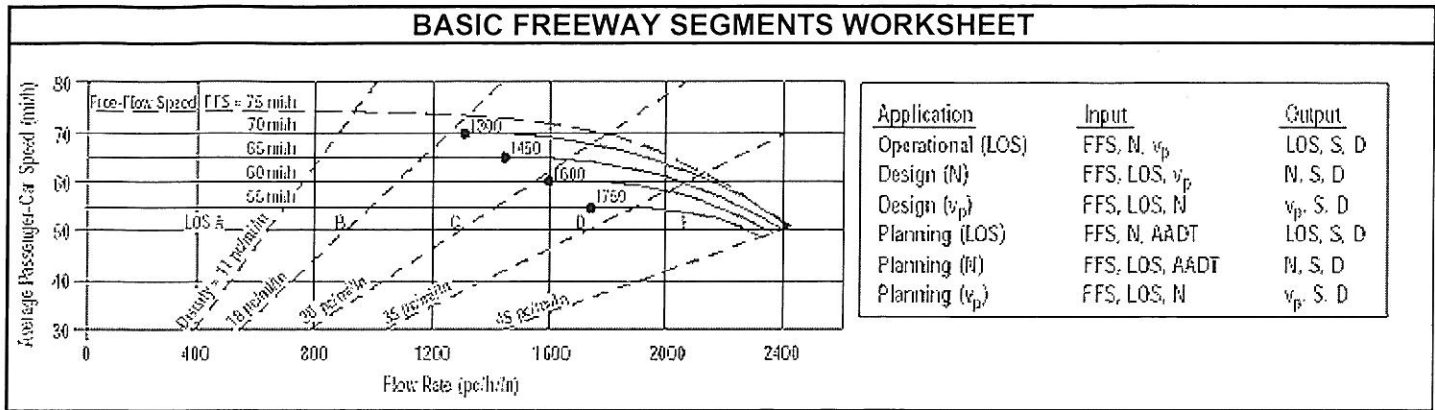
Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	f_{LW}	0.0 mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	f_{LC}	0.0 mi/h
Interchange Density	0.50 l/mi	f_{ID}	0.0 mi/h
Number of Lanes, N	2	f_N	4.5 mi/h
FFS (measured)		FFS	70.5 mi/h
Base free-flow Speed, BFFS	75.0 mi/h		

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

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 EB						
Agency or Company	AIM ENGINEERING	Junction	SR 951 EB ON						
Date Performed	3/16/2012	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{up} = ft V _u = veh/h	Number of Lanes, N Acceleration Lane Length, L _A Deceleration Lane Length L _D Freeway Volume, V _F Ramp Volume, V _R Freeway Free-Flow Speed, S _{FF} Ramp Free-Flow Speed, S _{FR}	2 465 2287 308 70.0 35.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> 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	2287	0.95	Level	6	0	0.971	0.90	2755	
Ramp	308	0.95	Level	6	0	0.971	0.90	371	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 2755 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	3126	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	3126	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information				Site Information					
Analyst	AL	Freeway/Dir of Travel	I-75 WB						
Agency or Company	AIM ENGINEERING	Junction	SR 951 OFF RAMP						
Date Performed	3/8/2012	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp	Number of Lanes, N		2			Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L _A					<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Deceleration Lane Length L _D		220			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L _{up} = ft	Freeway Volume, V _F		2039			L _{down} = ft			
V _u = veh/h	Ramp Volume, V _R		242			V _D = veh/h			
	Freeway Free-Flow Speed, S _{FF}		70.0						
	Ramp Free-Flow Speed, S _{FR}		45.0						
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	2039	0.95	Level	6	0	0.971	0.90	2456	
Ramp	242	0.95	Level	6	0	0.971	0.90	292	
UpStream									
DownStream									
Merge Areas				Diverge Areas					
Estimation of v ₁₂				Estimation of v ₁₂					
L _{EQ} =		V ₁₂ = V _F (P _{FM})			L _{EQ} =		V ₁₂ = V _R + (V _F - V _R)P _{FD}		
		(Equation 13-6 or 13-7)					(Equation 13-12 or 13-13)		
P _{FM} =		using Equation (Exhibit 13-6)			P _{FD} =		1.000 using Equation (Exhibit 13-7)		
V ₁₂ =		pc/h			V ₁₂ =		2456 pc/h		
V ₃ or V _{av34}		pc/h (Equation 13-14 or 13-17)			V ₃ or V _{av34}		0 pc/h (Equation 13-14 or 13-17)		
Is V ₃ or V _{av34} > 2,700 pc/h?		<input type="checkbox"/> Yes <input type="checkbox"/> No			Is V ₃ or V _{av34} > 2,700 pc/h?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2		<input type="checkbox"/> Yes <input type="checkbox"/> No			Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
If Yes, V _{12a} =		pc/h (Equation 13-16, 13-18, or 13-19)			If Yes, V _{12a} =		pc/h (Equation 13-16, 13-18, or 13-19)		
Capacity Checks				Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	2456	Exhibit 13-8	4800	No
					V _{FO} = V _F - V _R	2164	Exhibit 13-8	4800	No
					V _R	292	Exhibit 13-10	2100	No
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	2456	Exhibit 13-8	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 = 4.252 + 0.0086 V ₁₂ - 0.009 L _D				
D _R = (pc/mi/ln)					D _R = 23.4 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = C (Exhibit 13-2)				



General Information		Site Information	
Analyst	GSR	Highway/Direction of Travel	I-75
Agency or Company	AIM ENGINEERING	From/To	BTWN WB CR 951 ON/OFF-RAMPS
Date Performed	3/25/2012	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD
Project Description EVERGLADES IJR			
<input type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			

Flow Inputs

Volume, V	1797	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P_T	6
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	0.90		Up/Down %	

Calculate Flow Adjustments

f_p	0.90	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.971

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	f_{LW}	0.0 mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	f_{LC}	0.0 mi/h
Interchange Density	0.50 l/mi	f_{ID}	0.0 mi/h
Number of Lanes, N	2	f_N	4.5 mi/h
FFS (measured)		FFS	70.5 mi/h
Base free-flow Speed, BFFS	75.0 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
S	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$
D = v_p / S	S
LOS	D = v_p / S
	Required Number of Lanes, N

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	

BASIC FREEWAY SEGMENTS WORKSHEET																								
<p>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 representing different Free-Flow Speeds (FFS): 75 mi/h, 70 mi/h, 65 mi/h, 60 mi/h, and 55 mi/h. Points are plotted for flow rates of 1300, 1450, 1600, and 1750 pc/h/ln. Density lines are also shown for 11, 18, 28, 35, and 45 pc/mi/ln. The graph is divided into sections A, B, C, D, and E.</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Application</th> <th style="text-align: left;">Input</th> <th style="text-align: left;">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 (H)</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 (H)	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 (H)	FFS, LOS, AADT	N, S, D																						
Planning (v_p)	FFS, LOS, N	v_p , S, D																						
General Information		Site Information																						
Analyst	GSR	Highway/Direction of Travel	I-75 WB																					
Agency or Company	AIM ENGINEERING	From/To	CR 951/GG PKWY																					
Date Performed	4/22/2012	Jurisdiction																						
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD																					
Project Description EVERGLADES IJR																								
<input type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data																								
Flow Inputs																								
Volume, V	4090	veh/h	Peak-Hour Factor, PHF																					
AADT		veh/day	%Trucks and Buses, P_T																					
Peak-Hr Prop. of AADT, K			%RVs, P_R																					
Peak-Hr Direction Prop, D			General Terrain:																					
DDHV = AADT x K x D		veh/h	Grade % Length																					
Driver type adjustment	1.00		Up/Down %																					
Calculate Flow Adjustments																								
f_p	1.00	E_R	1.2																					
E_T	1.5	$f_{HV} = 1/(1+P_T(E_T - 1) + P_R(E_R - 1))$	0.971																					
Speed Inputs		Calc Speed Adj and FFS																						
Lane Width	12.0	ft	f_{LW}																					
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)		mi/h	FFS																					
Base free-flow Speed, BFFS	75.0	mi/h	72.0																					
LOS and Performance Measures		Design (N)																						
<u>Operational (LOS)</u>		<u>Design (N)</u>																						
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1478	pc/h/ln	Design LOS																					
S	71.7	mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																					
$D = v_p / S$	20.6	pc/mi/ln	S																					
LOS	C		$D = v_p / S$																					
		Required Number of Lanes, N																						
Glossary		Factor Location																						
N - Number of lanes	S - Speed	E_R - Exhibits 23-8, 23-10	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																								

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 NB						
Agency or Company	AIM ENGINEERING	Junction	GGP NB OFF RAMP						
Date Performed	3/8/2012	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp		Number of Lanes, N		3 ✓		Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A				<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D		310		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L _{up} = ft		Freeway Volume, V _F		4090 ✓		L _{down} = ft			
V _u = veh/h		Ramp Volume, V _R		502 ✓		V _D = veh/h			
		Freeway Free-Flow Speed, S _{FF}		70.0 ✓					
		Ramp Free-Flow Speed, S _{FR}		45.0 ✓					
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	4090	0.95 ✓	Level	6	0	0.971	1.00 ✓	4434	
Ramp	502	0.95	Level	6	0	0.971	1.00 ✓	544	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 0.624 using Equation (Exhibit 13-7) V ₁₂ = 2972 pc/h V ₃ or V _{av34} 1462 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	4434	Exhibit 13-8	7200	No
			V _{FO} = V _F - V _R	3890	Exhibit 13-8	7200	No		
			V _R	544	Exhibit 13-10	2100	No		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	2972	Exhibit 13-8 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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 27.0 (pc/mi/ln) LOS = C (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	AL		Freeway/Dir of Travel	I-75 NB		Agency or Company	AIM ENGINEERING		Junction	GOLDEN GATE PKWY NB ON
Date Performed	3/16/2012		Jurisdiction			Analysis Time Period	PM		Analysis Year	2039 NO-BUILD
Project Description										
Inputs										
Upstream Adj Ramp	Number of Lanes, N		3 ✓		Downstream Adj Ramp					
<input type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L _A		500		<input type="checkbox"/> Yes <input type="checkbox"/> On					
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Deceleration Lane Length L _D				<input checked="" type="checkbox"/> No <input type="checkbox"/> Off					
L _{up} = ft	Freeway Volume, V _F		3588 ✓		L _{down} = ft					
V _u = veh/h	Ramp Volume, V _R		2370 ✓		V _D = veh/h					
	Freeway Free-Flow Speed, S _{FF}		70.0 ✓							
	Ramp Free-Flow Speed, S _{FR}		35.0							
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	3588	0.95	Level	6	0	0.971	1.00	3890		
Ramp	2370	0.95	Level	6	0	0.971	1.00	2570		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v₁₂					Estimation of v₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = 0.591 using Equation (Exhibit 13-6) V ₁₂ = 2301 pc/h V ₃ or V _{av34} = 1589 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}	6460	Exhibit 13-8		No	V _F		Exhibit 13-8			
					V _{FO} = V _F - V _R		Exhibit 13-8			
					V _R		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}	4871	Exhibit 13-8		4600:All	Yes	V ₁₂	Exhibit 13-8			
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 = 39.2 (pc/mi/ln)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln)					
LOS = E (Exhibit 13-2)										

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: AL
Agency/Co.: AIM ENGINEERING
Date performed: 3/8/2012
Analysis time period: PM
Freeway/Dir of Travel: I-75 SB
Junction: GGP SB OFF RAMP
Jurisdiction:
Analysis Year: 2039 NO-BUILD
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6334	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1767	vph
Length of first accel/decel lane	165	ft
Length of second accel/decel lane	465	ft

Adjacent Ramp Data (if one exists)

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

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	6334	1767	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1667	465	v
Trucks and buses	6	6	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5*	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.971	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6867	1916	pcph

Estimation of V12 Diverge Areas

$$L = \text{(Equation 13-12 or 13-13)}$$

$$EQ$$

$$P = 0.450 \text{ Using Equation } 0$$

$$FD$$

$$v_{12R} = v_F + (v_R - v_{FD}) P = 4144 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6867	7200	No
$v_{FO} = v_F - v_R$	4951	7200	No
v_R	1916	4200	No
$v_3 \text{ or } v_{av34}$	2723 pc/h	(Equation 13-14 or 13-17)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		Yes	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 4167$		(Equation 13-15, 13-16, 13-18, or 13-19)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4167	4400	No

Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 32.9 \text{ pc/mi/ln}$$

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

Speed Estimation

Intermediate speed variable,	$D = 0.470$	
Space mean speed in ramp influence area,	$S_R = 56.8$	mph
Space mean speed in outer lanes,	$S_0 = 70.2$	mph
Space mean speed for all vehicles,	$S = 61.4$	mph

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information				Site Information					
Analyst	AL	Freeway/Dir of Travel	I-75 SB						
Agency or Company	AIM ENGINEERING	Junction	GOLDEN GATE PKWY SB ON						
Date Performed	3/16/2012	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2039 NO-BUILD						
Project Description									
Inputs									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Number of Lanes, N Acceleration Lane Length, L _A Deceleration Lane Length L _D	3 ✓ 550 4567 ✓	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Ramp Volume, V _R Freeway Free-Flow Speed, S _{FF} Ramp Free-Flow Speed, S _{FR}	639 ✓ 70.0 ✓ 35.0 ✓	L _{down} =	ft	V _D =	veh/h
L _{up} =	ft	V _u =	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	4567	0.95 ✓	Level	6	0	0.971	1.00 ✓	4952	
Ramp	639	0.95 ✓	Level	6	0	0.971	1.00 ✓	693	
UpStream									
DownStream									
Merge Areas				Diverge Areas					
Estimation of v₁₂				Estimation of v₁₂					
L _{EQ} =	V ₁₂ = V _F (P _{FM}) (Equation 13-6 or 13-7)			L _{EQ} =	V ₁₂ = V _R + (V _F - V _R)P _{FD} (Equation 13-12 or 13-13)				
P _{FM} =	0.593 using Equation (Exhibit 13-6)			P _{FD} =	using Equation (Exhibit 13-7)				
V ₁₂ =	2936 pc/h			V ₁₂ =	pc/h				
V ₃ or V _{av34}	2016 pc/h (Equation 13-14 or 13-17)			V ₃ or V _{av34}	pc/h (Equation 13-14 or 13-17)				
Is V ₃ or V _{av34} > 2,700 pc/h?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Is V ₃ or V _{av34} > 2,700 pc/h?	<input type="checkbox"/> Yes <input type="checkbox"/> No				
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2	<input type="checkbox"/> Yes <input type="checkbox"/> No				
If Yes, V _{12a} =	pc/h (Equation 13-16, 13-18, or 13-19)			If Yes, V _{12a} =	pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks				Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	5645	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	3629	Exhibit 13-8 4600:All		No	V ₁₂		Exhibit 13-8		
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 = 4.252 + 0.0086 V ₁₂ - 0.009 L _D					
D _R = 30.0 (pc/mi/ln)				D _R = (pc/mi/ln)					
LOS = D (Exhibit 13-2)									

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	AL	Freeway/Dir of Travel	I-75 EB						
Agency or Company	AIM ENGINEERING	Junction	SR 29 OFF RAMP						
Date Performed	3/8/2012	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2039 GREEN						
Project Description									
Inputs									
Upstream Adj Ramp		Number of Lanes, N		2 ✓		Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L _A				<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L _D		202		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L _{up} = ft		Freeway Volume, V _F		2010 ✓		L _{down} = ft			
V _u = veh/h		Ramp Volume, V _R		651 ✓		V _D = veh/h			
		Freeway Free-Flow Speed, S _{FF}		70.0 ✓					
		Ramp Free-Flow Speed, S _{FR}		45.0 ✓					
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	2010	0.95 ✓	Level	6	0	0.971	0.90 ✓	2421	
Ramp	651	0.95 ✓	Level	22	0	0.901	0.90 ✓	845	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 2421 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?		
V _{FO}		Exhibit 13-8			V _F	2421	Exhibit 13-8	4800	No
					V _{FO} = V _F - V _R	1576	Exhibit 13-8	4800	No
					V _R	845	Exhibit 13-10	2100	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?		
V _{R12}		Exhibit 13-8			V ₁₂	2421	Exhibit 13-8	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 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 23.3 (pc/mi/ln) LOS = C (Exhibit 13-2)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information				Site Information					
Analyst	AL	Freeway/Dir of Travel	I-75 EB						
Agency or Company	AIM ENGINEERING	Junction	SR 29 EB ON						
Date Performed	3/16/2012	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2039 GREEN						
Project Description									
Inputs									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Number of Lanes, N Acceleration Lane Length, L _A Deceleration Lane Length L _D	2 ✓ 560 1359 ✓	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Ramp Volume, V _R Freeway Free-Flow Speed, S _{FF} Ramp Free-Flow Speed, S _{FR}	306 ✓ 70.0 ✓ 35.0	L _{up} = ft V _u = veh/h	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	1359	0.95 ✓	Level	6	0	0.971	0.90 ✓	1637	
Ramp	306	0.95 ✓	Level	22	0	0.901	0.90	397	
UpStream									
DownStream									
Merge Areas				Diverge Areas					
Estimation of v ₁₂				Estimation of v ₁₂					
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1637 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks				Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity	LOS F?	
V _{FO}	2034	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable	Violation?	
V _{R12}	2034	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
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 = 17.6 (pc/mi/ln) LOS = B (Exhibit 13-2)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					