

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	JRE	Freeway/Dir of Travel	I-80 Westbound						
Agency or Company	AECOM	Junction	Int. 303 from Route 611						
Date Performed	9/11/2014	Jurisdiction							
Analysis Time Period	A.M. Peak Hour	Analysis Year	Alt B1 Ph II 2045						
Project Description Interstate 80 Reconstruction									
Inputs									
Upstream Adj Ramp	Number of Lanes, N		3		Downstream Adj Ramp				
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L <sub>A</sub>		600		<input type="checkbox"/> Yes <input type="checkbox"/> On				
<input type="checkbox"/> No <input checked="" type="checkbox"/> Off	Deceleration Lane Length L <sub>D</sub>				<input checked="" type="checkbox"/> No <input type="checkbox"/> Off				
L <sub>up</sub> = 2600 ft	Freeway Volume, V <sub>F</sub>		2136		L <sub>down</sub> = ft				
V <sub>u</sub> = 174 veh/h	Ramp Volume, V <sub>R</sub>		173		V <sub>D</sub> = veh/h				
	Freeway Free-Flow Speed, S <sub>FF</sub>		70.0						
	Ramp Free-Flow Speed, S <sub>FR</sub>		35.0						
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2136	0.97	Rolling	12	1	0.840	0.95	2758	
Ramp	173	0.74	Rolling	2	0	0.971	0.95	253	
UpStream	174	0.94	Rolling	8	1	0.885	0.95	220	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = 338.95 (Equation 13-6 or 13-7) P <sub>FM</sub> = 0.594 using Equation (Exhibit 13-6) V <sub>12</sub> = 1639 pc/h V <sub>3</sub> or V <sub>av34</sub> = 1119 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	3011	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	1892	Exhibit 13-8		No	V <sub>12</sub>		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 <sub>R</sub> = 16.4 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> = 0.305 (Exhibit 13-11)					D <sub>S</sub> = (Exhibit 13-12)				
S <sub>R</sub> = 61.5 mph (Exhibit 13-11)					S <sub>R</sub> = mph (Exhibit 13-12)				
S <sub>0</sub> = 67.8 mph (Exhibit 13-11)					S <sub>0</sub> = mph (Exhibit 13-12)				
S = 63.7 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information				Site Information					
Analyst	JRE	Freeway/Dir of Travel	I-80 Westbound						
Agency or Company	AECOM	Junction	Int. 303 from Route 611						
Date Performed	9/11/2014	Jurisdiction							
Analysis Time Period	P.M. Peak Hour	Analysis Year	Alt B1 Ph II 2045						
Project Description Interstate 80 Reconstruction									
Inputs									
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off L <sub>up</sub> = 2600 ft V <sub>u</sub> = 269 veh/h	Number of Lanes, N Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> Freeway Volume, V <sub>F</sub> Ramp Volume, V <sub>R</sub> Freeway Free-Flow Speed, S <sub>FF</sub> Ramp Free-Flow Speed, S <sub>FR</sub>	3 600  4414 332 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 <sub>down</sub> = ft V <sub>D</sub> = veh/h			
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	4414	0.97	Rolling	13	1	0.830	0.95	5772	
Ramp	332	0.87	Rolling	1	0	0.985	0.95	408	
UpStream	269	0.94	Rolling	2	1	0.962	0.95	313	
DownStream									
Merge Areas				Diverge Areas					
Estimation of v <sub>12</sub>				Estimation of v <sub>12</sub>					
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = 1017.12 (Equation 13-6 or 13-7) P <sub>FM</sub> = 0.594 using Equation (Exhibit 13-6) V <sub>12</sub> = 3430 pc/h V <sub>3</sub> or V <sub>av34</sub> = 2342 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks				Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	6180	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	3838	Exhibit 13-8		4600:All	No	V <sub>12</sub>	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 <sub>R</sub> = 31.5 (pc/mi/ln) LOS = D (Exhibit 13-2)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)					
Speed Determination				Speed Determination					
M <sub>S</sub> = 0.460 (Exhibit 13-11) S <sub>R</sub> = 57.1 mph (Exhibit 13-11) S <sub>0</sub> = 63.2 mph (Exhibit 13-11) S = 59.3 mph (Exhibit 13-13)				D <sub>s</sub> = (Exhibit 13-12) S <sub>R</sub> = mph (Exhibit 13-12) S <sub>0</sub> = mph (Exhibit 13-12) S = mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	JRE	Freeway/Dir of Travel	I-80 Westbound						
Agency or Company	AECOM	Junction	Int. 305 from Main St						
Date Performed	9/11/2014	Jurisdiction							
Analysis Time Period	A.M. Peak Hour	Analysis Year	Alt B1 Ph II 2045						
Project Description Interstate 80 Reconstruction									
Inputs									
Upstream Adj Ramp	Number of Lanes, N		3		Downstream Adj Ramp				
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> On	Acceleration Lane Length, L <sub>A</sub>		1500		<input type="checkbox"/> Yes <input type="checkbox"/> On				
<input type="checkbox"/> No <input checked="" type="checkbox"/> Off	Deceleration Lane Length L <sub>D</sub>				<input checked="" type="checkbox"/> No <input type="checkbox"/> Off				
L <sub>up</sub> = 2700 ft	Freeway Volume, V <sub>F</sub>		1904		L <sub>down</sub> = ft				
V <sub>u</sub> = 1302 veh/h	Ramp Volume, V <sub>R</sub>		196		V <sub>D</sub> = veh/h				
	Freeway Free-Flow Speed, S <sub>FF</sub>		70.0						
	Ramp Free-Flow Speed, S <sub>FR</sub>		35.0						
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	1904	0.97	Rolling	12	1	0.840	0.95	2459	
Ramp	196	0.94	Rolling	8	1	0.885	0.95	248	
UpStream	1302	0.94	Rolling	8	1	0.885	0.95	1648	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = 673.50 (Equation 13-6 or 13-7) P <sub>FM</sub> = 0.619 using Equation (Exhibit 13-6) V <sub>12</sub> = 1523 pc/h V <sub>3</sub> or V <sub>av34</sub> = 936 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	2707	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	1771	Exhibit 13-8		No	V <sub>12</sub>		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 <sub>R</sub> = 9.8 (pc/mi/ln) LOS = A (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> = 0.239 (Exhibit 13-11)					D <sub>S</sub> = (Exhibit 13-12)				
S <sub>R</sub> = 63.3 mph (Exhibit 13-11)					S <sub>R</sub> = mph (Exhibit 13-12)				
S <sub>0</sub> = 68.4 mph (Exhibit 13-11)					S <sub>0</sub> = mph (Exhibit 13-12)				
S = 65.0 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	JRE	Freeway/Dir of Travel	I-80 Westbound						
Agency or Company	AECOM	Junction	Int. 305 from Main St						
Date Performed	9/11/2014	Jurisdiction							
Analysis Time Period	P.M. Peak Hour	Analysis Year	Alt B1 Ph II 2045						
Project Description Interstate 80 Reconstruction									
Inputs									
Upstream Adj Ramp		Number of Lanes, N		3		Downstream Adj Ramp			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>		1500		<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input type="checkbox"/> No <input checked="" type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>				<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L <sub>up</sub> = 2700 ft		Freeway Volume, V <sub>F</sub>		4069		L <sub>down</sub> = ft			
V <sub>u</sub> = 2603 veh/h		Ramp Volume, V <sub>R</sub>		360		V <sub>D</sub> = veh/h			
		Freeway Free-Flow Speed, S <sub>FF</sub>		70.0					
		Ramp Free-Flow Speed, S <sub>FR</sub>		35.0					
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	4069	0.97	Rolling	13	1	0.830	0.95	5321	
Ramp	360	0.94	Rolling	2	1	0.962	0.95	419	
UpStream	2603	0.94	Rolling	2	1	0.962	0.95	3031	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = 1322.56 (Equation 13-6 or 13-7) P <sub>FM</sub> = 0.619 using Equation (Exhibit 13-6) V <sub>12</sub> = 3296 pc/h V <sub>3</sub> or V <sub>av34</sub> = 2025 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	5740	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	3715	Exhibit 13-8 4600:All		No	V <sub>12</sub>		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 <sub>R</sub> = 24.9 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> = 0.376 (Exhibit 13-11)					D <sub>S</sub> = (Exhibit 13-12)				
S <sub>R</sub> = 59.5 mph (Exhibit 13-11)					S <sub>R</sub> = mph (Exhibit 13-12)				
S <sub>0</sub> = 64.5 mph (Exhibit 13-11)					S <sub>0</sub> = mph (Exhibit 13-12)				
S = 61.2 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		JRE			Freeway/Dir of Travel		I-80 Eastbound		
Agency or Company		AECOM			Junction		Int. 304 from US 209		
Date Performed		9/11/2014			Jurisdiction				
Analysis Time Period		A.M. Peak Hour			Analysis Year		Alt B1 Ph II 2045		
Project Description Interstate 80 Reconstruction									
Inputs									
Upstream Adj Ramp		Number of Lanes, N			3			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>			1050			<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>						<input type="checkbox"/> No <input type="checkbox"/> Off	
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>			2302			L <sub>down</sub> = 3500 ft	
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>			1468			V <sub>D</sub> = 434 veh/h	
		Freeway Free-Flow Speed, S <sub>FF</sub>			70.0				
		Ramp Free-Flow Speed, S <sub>FR</sub>			35.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2302	0.94	Rolling	10	1	0.862	0.95	2990	
Ramp	1468	0.94	Rolling	5	1	0.922	0.95	1784	
UpStream									
DownStream	434	0.82	Rolling	2	0	0.971	0.95	574	
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L <sub>EQ</sub> = P <sub>FM</sub> = 0.607 using Equation (Exhibit 13-6) V <sub>12</sub> = 1815 pc/h V <sub>3</sub> or V <sub>av34</sub> = 1175 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = 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 <sub>EQ</sub> = P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	4774	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	3599	Exhibit 13-8		No	V <sub>12</sub>		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 <sub>R</sub> = 26.1 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> = 0.390 (Exhibit 13-11)					D <sub>S</sub> = (Exhibit 13-12)				
S <sub>R</sub> = 59.1 mph (Exhibit 13-11)					S <sub>R</sub> = mph (Exhibit 13-12)				
S <sub>0</sub> = 67.6 mph (Exhibit 13-11)					S <sub>0</sub> = mph (Exhibit 13-12)				
S = 61.0 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	JRE	Freeway/Dir of Travel	I-80 Eastbound						
Agency or Company	AECOM	Junction	Int. 304 from US 209						
Date Performed	9/11/2014	Jurisdiction							
Analysis Time Period	P.M. Peak Hour	Analysis Year	Alt B1 Ph II 2045						
Project Description Interstate 80 Reconstruction									
Inputs									
Upstream Adj Ramp		Number of Lanes, N		3		Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>		1050		<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>				<input type="checkbox"/> No <input type="checkbox"/> Off			
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>		2898		L <sub>down</sub> = 1500 ft			
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>		1334		V <sub>D</sub> = 454 veh/h			
		Freeway Free-Flow Speed, S <sub>FF</sub>		70.0					
		Ramp Free-Flow Speed, S <sub>FR</sub>		35.0					
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2898	0.94	Rolling	10	1	0.862	0.95	3764	
Ramp	1334	0.94	Rolling	5	1	0.922	0.95	1621	
UpStream									
DownStream	454	0.82	Rolling	2	0	0.971	0.95	600	
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L <sub>EQ</sub> = P <sub>FM</sub> = 0.607 using Equation (Exhibit 13-6) V <sub>12</sub> = 2284 pc/h V <sub>3</sub> or V <sub>av34</sub> = 1480 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = 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 <sub>EQ</sub> = P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	5385	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	3905	Exhibit 13-8 4600:All		No	V <sub>12</sub>		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 <sub>R</sub> = 28.6 (pc/mi/ln) LOS = D (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> = 0.441 (Exhibit 13-11)					D <sub>s</sub> = (Exhibit 13-12)				
S <sub>R</sub> = 57.6 mph (Exhibit 13-11)					S <sub>R</sub> = mph (Exhibit 13-12)				
S <sub>0</sub> = 66.5 mph (Exhibit 13-11)					S <sub>0</sub> = mph (Exhibit 13-12)				
S = 59.8 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				