

APPENDIX C

RAMP JUNCTION

LEVELS OF SERVICE HCS OUTPUT

GENERAL PURPOSE LANES

BUILD

NORTHBOUND

LEVELS OF SERVICE HCS OUTPUT

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Valley View Entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2660 ft $V_D =$ 849 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9662	0.90	Level	3	0	0.985	1.00	10897	
Ramp	743	0.90	Level	3	0	0.985	1.00	838	
UpStream									
DownStream	849	0.90	Level	3	0	0.985	1.00	957	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.252$ using Equation (Exhibit 25-5) $V_{12} = 2751$ pc/h V_3 or $V_{av34} = 4073$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 5497$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11735	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	6335	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 51.4$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 2.480$ (Exhibit 25-19) $S_R = 0.5$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 1.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Whitlock_Off			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10422	0.90	Level	3	0	0.985	1.00	11754	
Ramp	627	0.90	Level	3	0	0.985	1.00	707	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 4499 pc/h V_3 or V_{av34} 2452 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9404	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	8697	Exhibit 25-14	9600	No	
				V_R	707	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4499	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 38.4 (pc/mi/ln) $LOS =$ E (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.427 (Exhibit 25-19) $S_R =$ 58.1 mph (Exhibit 25-19) $S_0 =$ 71.1 mph (Exhibit 25-19) $S =$ 64.2 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	SH 190_Exit					
Date Performed	2/26/2009		Jurisdiction	Carrollton					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1230$ ft $V_u = 805$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10051	0.90	Level	3	0	0.985	1.00	11335	
Ramp	4123	0.90	Level	3	0	0.985	1.00	4650	
UpStream	805	0.90	Level	3	0	0.985	1.00	908	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.260$ using Equation (Exhibit 25-12) $V_{12} = 6388$ pc/h V_3 or $V_{av34} 2473$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	11335	Exhibit 25-14	9600	Yes
				$V_{FO} = V_F - V_R$	6685	Exhibit 25-14	9600	No	
				V_R	4650	Exhibit 25-3	4100	Yes	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	6388	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 45.7$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.651$ (Exhibit 25-19) $S_R = 51.8$ mph (Exhibit 25-19) $S_0 = 71.0$ mph (Exhibit 25-19) $S = 58.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Frankford_Exit			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 5530 ft $V_D =$ 1371 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5928	0.90	Level	3	0	0.985	1.00	6685	
Ramp	796	0.90	Level	3	0	0.985	1.00	898	
UpStream									
DownStream	1371	0.90	Level	3	0	0.985	1.00	1546	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.552$ using Equation (Exhibit 25-12) $V_{12} = 4090$ pc/h V_3 or $V_{av34} 2595$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6685	Exhibit 25-14	7200	No
				$V_{FO} = V_F - V_R$	5787	Exhibit 25-14	7200	No	
				V_R	898	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4090	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 34.9$ (pc/mi/ln) $LOS = D$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.444$ (Exhibit 25-19) $S_R = 57.6$ mph (Exhibit 25-19) $S_0 = 70.6$ mph (Exhibit 25-19) $S = 62.0$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel		Northbound				
Agency or Company	CAI		Junction		Frankford On				
Date Performed	2/26/2009		Jurisdiction		Carrollton				
Analysis Time Period	DHV		Analysis Year		2030				
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp			Terrain: Level				Downstream Adj Ramp		
☐ Yes ☐ On ☒ No ☐ Off							☒ Yes ☐ On ☐ No ☒ Off		
L _{up} = ft			S _{FF} = 70.0 mph S _{FR} = 50.0 mph				L _{down} = 3400 ft		
V _u = veh/h			Sketch (show lanes, L _A , L _D , V _R , V _I)				V _D = 956 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	5530	0.90	Level	3	0	0.985	1.00	6237	
Ramp	1371	0.90	Level	3	0	0.985	1.00	1546	
UpStream									
DownStream	956	0.90	Level	3	0	0.985	1.00	1078	
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ L _{EQ} = 6609.44 (Equation 25-2 or 25-3) P _{FM} = 0.632 using Equation (Exhibit 25-5) V ₁₂ = 3942 pc/h V ₃ or V _{av34} = 2295 pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☒ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☒ No If Yes, V _{12a} = pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 25-8 or 25-9) P _{FD} = using Equation (Exhibit 25-12) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	7783	Exhibit 25-7		Yes	V _F		Exhibit 25-14		
					V _{FO} = V _F - V _R		Exhibit 25-14		
					V _R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	5488	Exhibit 25-7	4600:All	No	V ₁₂		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 44.4 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = 1.214 (Exhibit 25-19)					D _S = (Exhibit 25-19)				
S _R = 36.0 mph (Exhibit 25-19)					S _R = mph (Exhibit 25-19)				
S ₀ = 63.5 mph (Exhibit 25-19)					S ₀ = mph (Exhibit 25-19)				
S = 41.3 mph (Exhibit 25-14)					S = mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		FM 3040 Exit			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 3400 ft $V_D =$ 1371 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6503	0.90	Level	3	0	0.985	1.00	7334	
Ramp	956	0.90	Level	3	0	0.985	1.00	1078	
UpStream									
DownStream	1371	0.90	Level	3	0	0.985	1.00	1546	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.527$ using Equation (Exhibit 25-12) $V_{12} = 4375$ pc/h V_3 or $V_{av34} 2959$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 4634$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7334	Exhibit 25-14	7200	Yes
					$V_{FO} = V_F - V_R$	6256	Exhibit 25-14	7200	No
					V_R	1078	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4375	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 39.6$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.460$ (Exhibit 25-19) $S_R = 57.1$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 61.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		SH 121 On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1600 ft $V_D =$ 699 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5547	0.90	Level	3	0	0.985	1.00	6256	
Ramp	3353	0.90	Level	3	0	0.985	1.00	3781	
UpStream									
DownStream	699	0.90	Level	3	0	0.985	1.00	788	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ -0.115 using Equation (Exhibit 25-5) $P_{FM} =$ 5 $V_{12} =$ -548 pc/h V_3 or V_{av34} 2651 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 1902 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8536	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	5683	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 44.9 (pc/mi/ln) LOS = E (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 1.427 (Exhibit 25-19) $S_R =$ 30.0 mph (Exhibit 25-19) $S_0 =$ 66.7 mph (Exhibit 25-19) $S =$ 36.8 mph (Exhibit 25-14)					$D_s =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		HOV On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 120 ft $V_D =$ 1088 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8900	0.90	Level	3	0	0.985	1.00	10037	
Ramp	699	0.90	Level	3	0	0.985	1.00	788	
UpStream									
DownStream	1088	0.90	Level	3	0	0.985	1.00	1227	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.259$ using Equation (Exhibit 25-5) $V_{12} = 1950$ pc/h V_3 or $V_{av34} = 2793$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2137$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8325	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2925	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 24.8$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.354$ (Exhibit 25-19) $S_R = 60.1$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 60.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET													
General Information					Site Information								
Analyst		LWC		Freeway/Dir of Travel		Northbound							
Agency or Company		CAI		Junction		HOV_Exit							
Date Performed		2/26/2009		Jurisdiction		Lewisville							
Analysis Time Period		DHV		Analysis Year		2030							
Project Description Ramp Junction Analysis Northbound General Purpose Lanes													
Inputs													
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1230$ ft $V_u = 1318$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h						
Conversion to pc/h Under Base Conditions													
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$					
Freeway	9369	0.90	Level	3	0	0.985	1.00	10566					
Ramp	956	0.90	Level	3	0	0.985	1.00	1078					
UpStream	1318	0.90	Level	3	0	0.985	1.00	1486					
DownStream													
Merge Areas					Diverge Areas								
Estimation of v_{12}					Estimation of v_{12}								
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 4293$ pc/h V_3 or $V_{av34} 2080$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)								
Capacity Checks					Capacity Checks								
		Actual	Capacity		LOS F?								
V_{FO}		Exhibit 25-7					V_F	8453	Exhibit 25-14	9600	No		
							$V_{FO} = V_F - V_R$	7375	Exhibit 25-14	9600	No		
							V_R	1078	Exhibit 25-3	2100	No		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area								
		Actual	Max Desirable		Violation?				Actual	Max Desirable		Violation?	
V_{R12}			Exhibit 25-7				V_{12}	4293	Exhibit 25-14	4400:All	No		
Level of Service Determination (if not F)					Level of Service Determination (if not F)								
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 36.7$ (pc/mi/ln) $LOS = E$ (Exhibit 25-4)								
Speed Determination					Speed Determination								
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.460$ (Exhibit 25-19) $S_R = 57.1$ mph (Exhibit 25-19) $S_0 = 72.6$ mph (Exhibit 25-19) $S = 63.8$ mph (Exhibit 25-15)								

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Fox Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2520$ ft $V_u = 787$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8785	0.90	Level	3	0	0.985	1.00	9908	
Ramp	1655	0.90	Level	3	0	0.985	1.00	1866	
UpStream	787	0.90	Level	3	0	0.985	1.00	888	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 5372$ pc/h V_3 or $V_{av34} 2268$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9908	Exhibit 25-14	9600	Yes
				$V_{FO} = V_F - V_R$	8042	Exhibit 25-14	9600	No	
				V_R	1866	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5372	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 46.0$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.531$ (Exhibit 25-19) $S_R = 55.1$ mph (Exhibit 25-19) $S_0 = 71.8$ mph (Exhibit 25-19) $S = 61.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Lake Park On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 3400$ ft $V_u = 920$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7439	0.90	Level	3	0	0.985	1.00	8390	
Ramp	681	0.90	Level	3	0	0.985	1.00	768	
UpStream	920	0.90	Level	3	0	0.985	1.00	1038	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.261$ using Equation (Exhibit 25-5) $V_{12} = 2191$ pc/h V_3 or $V_{av34} = 3099$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2990$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9158	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3758	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 31.3$ (pc/mi/ln) LOS = D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.448$ (Exhibit 25-19) $S_R = 57.5$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 59.5$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Denton Drive Exit			
Date Performed		2/26/2009		Jurisdiction		Hickory Creek			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 3620 ft $V_D =$ 1363 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8120	0.90	Level	3	0	0.985	1.00	9158	
Ramp	549	0.90	Level	3	0	0.985	1.00	619	
UpStream									
DownStream	1363	0.90	Level	3	0	0.985	1.00	1537	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ 0.436 using Equation (Exhibit 25-12) $P_{FD} =$ 4342 pc/h $V_{12} =$ 2408 pc/h (Equation 25-15 or 25-16) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9158	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	8539	Exhibit 25-14	9600	No	
				V_R	619	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4342	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 37.1 (pc/mi/ln) $LOS =$ E (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.419 (Exhibit 25-19) $S_R =$ 58.3 mph (Exhibit 25-19) $S_0 =$ 71.3 mph (Exhibit 25-19) $S =$ 64.5 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	Hundley Exit					
Date Performed	2/26/2009		Jurisdiction	Lake Dallas					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 3620$ ft $V_u = 549$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7571	0.90	Level	3	0	0.985	1.00	8538	
Ramp	1363	0.90	Level	3	0	0.985	1.00	1537	
UpStream	549	0.90	Level	3	0	0.985	1.00	619	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 4589$ pc/h V_3 or V_{av34} 1974 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8538	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	7001	Exhibit 25-14	9600	No	
				V_R	1537	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4589	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 39.2$ (pc/mi/ln) $LOS = E$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.501$ (Exhibit 25-19) $S_R = 56.0$ mph (Exhibit 25-19) $S_0 = 73.0$ mph (Exhibit 25-19) $S = 62.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		HOV_Corinth_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1900$ ft $V_u = 265$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7252	0.90	Level	3	0	0.985	1.00	8179	
Ramp	195	0.90	Level	3	0	0.985	1.00	220	
UpStream	265	0.90	Level	3	0	0.985	1.00	299	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 3690$ pc/h V_3 or $V_{av34} 2244$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8179	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	7959	Exhibit 25-14	9600	No	
				V_R	220	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3690	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 34.7$ (pc/mi/ln) $LOS = D$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.383$ (Exhibit 25-19) $S_R = 59.3$ mph (Exhibit 25-19) $S_0 = 72.7$ mph (Exhibit 25-19) $S = 65.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		PostOak_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} =$ 2100 ft $V_u =$ 265 veh/h			Terrain: Level $S_{FF} =$ 70.0 mph $S_{FR} =$ 40.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7057	0.90	Level	3	0	0.985	1.00	7959	
Ramp	1186	0.90	Level	3	0	0.985	1.00	1338	
UpStream	265	0.90	Level	3	0	0.985	1.00	299	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 4225 pc/h V_3 or V_{av34} 1867 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7959	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	6621	Exhibit 25-14	9600	No	
				V_R	1338	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4225	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 36.1 (pc/mi/ln) $LOS =$ E (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.483 (Exhibit 25-19) $S_R =$ 56.5 mph (Exhibit 25-19) $S_0 =$ 73.4 mph (Exhibit 25-19) $S =$ 63.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET													
General Information					Site Information								
Analyst		LWC		Freeway/Dir of Travel		Northbound							
Agency or Company		CAI		Junction		Teasley_Exit							
Date Performed		2/26/2009		Jurisdiction		Denton							
Analysis Time Period		DHV		Analysis Year		2030							
Project Description Ramp Junction Analysis Northbound General Purpose Lanes													
Inputs													
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 9800 ft $V_D =$ 159 veh/h						
Conversion to pc/h Under Base Conditions													
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$					
Freeway	5455	0.90	Level	3	0	0.985	1.00	6152					
Ramp	265	0.90	Level	3	0	0.985	1.00	299					
UpStream													
DownStream	159	0.90	Level	3	0	0.985	1.00	179					
Merge Areas					Diverge Areas								
Estimation of v_{12}					Estimation of v_{12}								
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 2851$ pc/h V_3 or $V_{av34} 1650$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)								
Capacity Checks					Capacity Checks								
		Actual	Capacity		LOS F?								
V_{FO}		Exhibit 25-7					V_F	6152	Exhibit 25-14	9600	No		
							$V_{FO} = V_F - V_R$	5853	Exhibit 25-14	9600	No		
							V_R	299	Exhibit 25-3	2100	No		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area								
		Actual	Max Desirable		Violation?				Actual	Max Desirable		Violation?	
V_{R12}			Exhibit 25-7				V_{12}		2851	Exhibit 25-14	4400:All	No	
Level of Service Determination (if not F)					Level of Service Determination (if not F)								
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 24.3$ (pc/mi/ln) $LOS = C$ (Exhibit 25-4)								
Speed Determination					Speed Determination								
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.390$ (Exhibit 25-19) $S_R = 59.1$ mph (Exhibit 25-19) $S_0 = 74.3$ mph (Exhibit 25-19) $S = 66.4$ mph (Exhibit 25-15)								

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		HOV_Hundley_On			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes_Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 980 ft $V_D =$ 664 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6208	0.90	Level	3	0	0.985	1.00	7001	
Ramp	451	0.90	Level	3	0	0.985	1.00	509	
UpStream									
DownStream	664	0.90	Level	3	0	0.985	1.00	749	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.294$ using Equation (Exhibit 25-5) $V_{12} = 2055$ pc/h V_3 or $V_{av34} = 2473$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2800$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7510	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3645	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 32.3$ (pc/mi/ln) LOS = D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.430$ (Exhibit 25-19) $S_R = 58.0$ mph (Exhibit 25-19) $S_0 = 65.2$ mph (Exhibit 25-19) $S = 61.4$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	HOV-Loop_288_On					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2400$ ft $V_u = 265$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5190	0.90	Level	3	0	0.985	1.00	5853	
Ramp	159	0.90	Level	3	0	0.985	1.00	179	
UpStream	265	0.90	Level	3	0	0.985	1.00	299	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.335$ using Equation (Exhibit 25-5) $V_{12} = 1960$ pc/h V_3 or $V_{av34} = 1946$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2341$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6032	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2800	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 25.6$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.345$ (Exhibit 25-19) $S_R = 60.3$ mph (Exhibit 25-19) $S_0 = 66.3$ mph (Exhibit 25-19) $S = 63.3$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		US 77 On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off L _{up} = 980 ft V _u = 159 veh/h			Terrain: Level S _{FF} = 70.0 mph S _{FR} = 40.0 mph Sketch (show lanes, L _A , L _D , V _R , V _I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{down} = ft V _D = veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF × f _{HV} × f _p	
Freeway	5349	0.90	Level	3	0	0.985	1.00	6032	
Ramp	1194	0.90	Level	3	0	0.985	1.00	1347	
UpStream	159	0.90	Level	3	0	0.985	1.00	179	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) L _{EQ} = P _{FM} = 0.189 using Equation (Exhibit 25-5) V ₁₂ = 1139 pc/h V ₃ or V _{av34} = 2446 pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☒ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☒ Yes ☐ No If Yes, V _{12a} = 2412 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) L _{EQ} = P _{FD} = using Equation (Exhibit 25-12) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	7379	Exhibit 25-7		No	V _F		Exhibit 25-14		
					V _{FO} = V _F - V _R		Exhibit 25-14		
					V _R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	3759	Exhibit 25-7	4600:All	No	V ₁₂		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 31.0 (pc/mi/ln) LOS = D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = 0.448 (Exhibit 25-19) S _R = 57.4 mph (Exhibit 25-19) S ₀ = 65.3 mph (Exhibit 25-19) S = 61.0 mph (Exhibit 25-14)					D _S = (Exhibit 25-19) S _R = mph (Exhibit 25-19) S ₀ = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET											
General Information					Site Information						
Analyst		LWC		Freeway/Dir of Travel		Northbound					
Agency or Company		CAI		Junction		FtWorthAve_Exit					
Date Performed		2/26/2009		Jurisdiction							
Analysis Time Period		DHV		Analysis Year		2030					
Project Description Ramp Junction Analysis Northbound General Purpose Lanes											
Inputs											
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 700 ft $V_D =$ 867 veh/h				
Conversion to pc/h Under Base Conditions											
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$			
Freeway	6543	0.90	Level	3	0	0.985	1.00	7379			
Ramp	770	0.90	Level	3	0	0.985	1.00	868			
UpStream											
DownStream	867	0.90	Level	3	0	0.985	1.00	978			
Merge Areas					Diverge Areas						
Estimation of v_{12}					Estimation of v_{12}						
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 3707$ pc/h V_3 or V_{av34} 1836 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)						
Capacity Checks					Capacity Checks						
		Actual	Capacity		LOS F?						
V_{FO}		Exhibit 25-7					V_F	7379	Exhibit 25-14	9600	No
							$V_{FO} = V_F - V_R$	6511	Exhibit 25-14	9600	No
							V_R	868	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area						
		Actual	Max Desirable		Violation?						
V_{R12}			Exhibit 25-7				V_{12}	3707	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)						
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 31.6$ (pc/mi/ln) $LOS = D$ (Exhibit 25-4)						
Speed Determination					Speed Determination						
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.441$ (Exhibit 25-19) $S_R = 57.6$ mph (Exhibit 25-19) $S_0 = 73.5$ mph (Exhibit 25-19) $S = 64.6$ mph (Exhibit 25-15)						

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		BonnieBrae_Exit			
Date Performed		2/26/2009		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1400 ft $V_D =$ 1239 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5985	0.90	Level	4	0	0.980	1.00	6783	
Ramp	982	0.90	Level	4	0	0.980	1.00	1113	
UpStream									
DownStream	1239	0.90	Level	4	0	0.980	1.00	1404	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ 2692.23 (Equation 25-8 or 25-9) $P_{FD} =$ 0.599 using Equation (Exhibit 25-12) $V_{12} =$ 4508 pc/h V_3 or V_{av34} 2275 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6783	Exhibit 25-14	7200	No
				$V_{FO} = V_F - V_R$	5670	Exhibit 25-14	7200	No	
				V_R	1113	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4508	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 38.5 (pc/mi/ln) $LOS =$ E (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.463 (Exhibit 25-19) $S_R =$ 57.0 mph (Exhibit 25-19) $S_0 =$ 71.8 mph (Exhibit 25-19) $S =$ 61.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		IH35W DC_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1400 ft $V_D =$ 982 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5003	0.90	Level	4	0	0.980	1.00	5670	
Ramp	1239	0.90	Level	4	0	0.980	1.00	1404	
UpStream									
DownStream	982	0.90	Level	4	0	0.980	1.00	1113	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ 2474.10 (Equation 25-8 or 25-9) $P_{FD} =$ 0.596 using Equation (Exhibit 25-12) $V_{12} =$ 3947 pc/h V_3 or V_{av34} 1723 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	5670	Exhibit 25-14	7200	No
				$V_{FO} = V_F - V_R$	4266	Exhibit 25-14	7200	No	
				V_R	1404	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3947	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 33.7 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.489 (Exhibit 25-19) $S_R =$ 56.3 mph (Exhibit 25-19) $S_0 =$ 74.0 mph (Exhibit 25-19) $S =$ 60.7 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Bonnie Brae On			
Date Performed		2/26/2009		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1300 ft $V_D =$ 3026 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3543	0.90	Level	4	0	0.980	1.00	4015	
Ramp	177	0.90	Level	4	0	0.980	1.00	201	
UpStream									
DownStream	3026	0.90	Level	4	0	0.980	1.00	3429	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 2375$ pc/h V_3 or $V_{av34} = 1640$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4216	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2576	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 22.3$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.332$ (Exhibit 25-19) $S_R = 60.7$ mph (Exhibit 25-19) $S_0 = 65.9$ mph (Exhibit 25-19) $S = 62.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Oak Street Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1270$ ft $V_u = 1239$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3764	0.90	Level	4	0	0.980	1.00	4266	
Ramp	221	0.90	Level	4	0	0.980	1.00	250	
UpStream	1239	0.90	Level	4	0	0.980	1.00	1404	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.642$ using Equation (Exhibit 25-12) $V_{12} = 2828$ pc/h V_3 or V_{av34} 1438 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4266	Exhibit 25-14	7200	No
				$V_{FO} = V_F - V_R$	4016	Exhibit 25-14	7200	No	
				V_R	250	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2828	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 24.1$ (pc/mi/ln) $LOS = C$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.386$ (Exhibit 25-19) $S_R = 59.2$ mph (Exhibit 25-19) $S_0 = 75.1$ mph (Exhibit 25-19) $S = 63.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Oak Street On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes Northbound									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1900$ ft $V_u = 1858$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4888	0.90	Level	4	0	0.980	1.00	5540	
Ramp	380	0.90	Level	4	0	0.980	1.00	431	
UpStream	1858	0.90	Level	4	0	0.980	1.00	2106	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.303$ using Equation (Exhibit 25-5) $V_{12} = 1277$ pc/h V_3 or $V_{av34} = 1467$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 1684$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	4642	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2115	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 18.6$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.313$ (Exhibit 25-19) $S_R = 61.2$ mph (Exhibit 25-19) $S_0 = 67.3$ mph (Exhibit 25-19) $S = 64.4$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

MANAGED LANES

BUILD

NORTHBOUND

LEVELS OF SERVICE HCS OUTPUT

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	Crosby exit					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	2185	0.90	Level	3	0	0.985	1.00	2464	
Ramp	602	0.90	Level	3	0	0.985	1.00	679	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 2464 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	2464	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	1785	Exhibit 25-14	4800	No	
				V_R	679	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2464	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 20.9 (pc/mi/ln) LOS = C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.424 (Exhibit 25-19) $S_R =$ 58.1 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.1 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound Managed Lanes					
Agency or Company	CAI		Junction	Beltline Road Entrance					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1583	0.90	Level	3	0	0.985	1.00	1785	
Ramp	947	0.90	Level	3	0	0.985	1.00	1068	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1785 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1785	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	717	Exhibit 25-14	4800	No	
				V_R	1068	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1785	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 15.1 (pc/mi/ln) $LOS =$ B (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.459 (Exhibit 25-19) $S_R =$ 57.1 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 57.1 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Dickerson exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	2530	0.90	Level	3	0	0.985	1.00	2853	
Ramp	1416	0.90	Level	3	0	0.985	1.00	1597	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 2853 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	2853	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	1256	Exhibit 25-14	4800	No	
				V_R	1597	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2853	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 24.3 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.507 (Exhibit 25-19) $S_R =$ 55.8 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 55.8 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Corporate Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 415 ft $V_D =$ 1283 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1114	0.90	Level	3	0	0.985	1.00	1256	
Ramp	699	0.90	Level	3	0	0.985	1.00	788	
UpStream									
DownStream	1283	0.90	Level	0	0	1.000	1.00	1426	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1256 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1256	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	468	Exhibit 25-14	4800	No	
				V_R	788	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1256	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 10.6 (pc/mi/ln) $LOS =$ B (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.434 (Exhibit 25-19) $S_R =$ 57.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 57.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound Managed Lanes			
Agency or Company		CAI		Junction		SH 121 Entrance			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 700$ ft $V_u = 699$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_T)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	415	0.90	Level	3	0	0.985	1.00	468	
Ramp	1283	0.90	Level	3	0	0.985	1.00	1447	
UpStream	699	0.90	Level	3	0	0.985	1.00	788	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 468$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	1915	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	1915	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 16.6$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.307$ (Exhibit 25-19) $S_R = 61.4$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.4$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound Managed Lanes			
Agency or Company		CAI		Junction		GPL Corporate			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1698	0.90	Level	3	0	0.985	1.00	1915	
Ramp	168	0.90	Level	3	0	0.985	1.00	189	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 1915$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	2104	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2104	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 18.7$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.313$ (Exhibit 25-19) $S_R = 61.2$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.2$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound Managed Lanes			
Agency or Company		CAI		Junction		Valley Ridge On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1061	0.90	Level	3	0	0.985	1.00	1197	
Ramp	53	0.90	Level	3	0	0.985	1.00	60	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 1197$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	1257	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	1257	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 12.1$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.295$ (Exhibit 25-19) $S_R = 61.7$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Valley Ridge Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 3300 ft $V_D =$ 53 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1866	0.90	Level	3	0	0.985	1.00	2104	
Ramp	699	0.90	Level	3	0	0.985	1.00	788	
UpStream									
DownStream	53	0.90	Level	0	0	1.000	1.00	59	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 2104 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	2104	Exhibit 25-14	4800	No
					$V_{FO} = V_F - V_R$	1316	Exhibit 25-14	4800	No
					V_R	788	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2104	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 17.8 (pc/mi/ln) $LOS =$ B (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.434 (Exhibit 25-19) $S_R =$ 57.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 57.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound Managed Lanes			
Agency or Company		CAI		Junction		Lake Park On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1114	0.90	Level	3	0	0.985	1.00	1256	
Ramp	327	0.90	Level	3	0	0.985	1.00	369	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 1256$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	1625	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	1625	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 14.8$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.301$ (Exhibit 25-19) $S_R = 61.6$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	Hundley Exit					
Date Performed	2/26/2009		Jurisdiction	Lake Dallas					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_l)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1441	0.90	Level	3	0	0.985	1.00	1625	
Ramp	460	0.90	Level	3	0	0.985	1.00	519	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1625 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1625	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	1106	Exhibit 25-14	4800	No	
				V_R	519	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1625	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 13.7 (pc/mi/ln) LOS = B (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.410 (Exhibit 25-19) $S_R =$ 58.5 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.5 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Swisher Exit			
Date Performed		2/26/2009		Jurisdiction		Lake Dallas			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	981	0.90	Level	3	0	0.985	1.00	1106	
Ramp	451	0.90	Level	3	0	0.985	1.00	509	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1106 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1106	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	597	Exhibit 25-14	4800	No	
				V_R	509	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1106	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 9.3 (pc/mi/ln) LOS = A (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.409 (Exhibit 25-19) $S_R =$ 58.6 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.6 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC			Freeway/Dir of Travel		Northbound Managed Lanes		
Agency or Company		CAI			Junction		Dobbs On		
Date Performed		2/26/2009			Jurisdiction				
Analysis Time Period		DHV			Analysis Year		2030		
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h		Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)					Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	530	0.90	Level	3	0	0.985	1.00	598	
Ramp	195	0.90	Level	3	0	0.985	1.00	220	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 598$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	818	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	818	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 8.6$ (pc/mi/ln) LOS = A (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.290$ (Exhibit 25-19) $S_R = 61.9$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.9$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Loop 288 Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	725	0.90	Level	3	0	0.985	1.00	818	
Ramp	301	0.90	Level	3	0	0.985	1.00	339	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 818 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	818	Exhibit 25-14	4800	No
					$V_{FO} = V_F - V_R$	479	Exhibit 25-14	4800	No
					V_R	339	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	818	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 6.8 (pc/mi/ln) $LOS =$ A (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.394 (Exhibit 25-19) $S_R =$ 59.0 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 59.0 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	US77 Exit					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1500$ ft $V_u = 159$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	424	0.90	Level	3	0	0.985	1.00	478	
Ramp	195	0.90	Level	3	0	0.985	1.00	220	
UpStream	159	0.90	Level	0	0	1.000	1.00	177	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 478$ pc/h V_3 or $V_{av34} 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	478	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	258	Exhibit 25-14	4800	No	
				V_R	220	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	478	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 3.9$ (pc/mi/ln) $LOS = A$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.383$ (Exhibit 25-19) $S_R = 59.3$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 59.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	Teasley_Exit					
Date Performed	2/26/2009		Jurisdiction	Denton					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	229	0.90	Level	3	0	0.985	1.00	258	
Ramp	159	0.90	Level	3	0	0.985	1.00	179	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 213 pc/h V_3 or V_{av34} 22 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	258	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	79	Exhibit 25-14	9600	No	
				V_R	179	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	213	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 1.6 (pc/mi/ln) LOS = A (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.379 (Exhibit 25-19) $S_R =$ 59.4 mph (Exhibit 25-19) $S_0 =$ 76.8 mph (Exhibit 25-19) $S =$ 61.8 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound Managed Lanes			
Agency or Company		CAI		Junction		GPL Teasly On			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	70	0.90	Level	3	0	0.985	1.00	79	
Ramp	177	0.90	Level	3	0	0.985	1.00	200	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 79$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	279	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	279	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 4.4$ (pc/mi/ln) LOS = A (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.286$ (Exhibit 25-19) $S_R = 62.0$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 62.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

GENERAL PURPOSE LANES

BUILD

SOUTHBOUND

LEVELS OF SERVICE HCS OUTPUT

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Oak Street Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 3800 ft $V_D =$ 1805 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5406	0.90	Level	4	0	0.980	1.00	6127	
Ramp	327	0.90	Level	4	0	0.980	1.00	371	
UpStream									
DownStream	1805	0.90	Level	4	0	0.980	1.00	2046	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 2480$ pc/h V_3 or $V_{av34} 1364$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	5208	Exhibit 25-14	9600	No
					$V_{FO} = V_F - V_R$	4837	Exhibit 25-14	9600	No
					V_R	371	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2480	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 21.1$ (pc/mi/ln) $LOS = C$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.396$ (Exhibit 25-19) $S_R = 58.9$ mph (Exhibit 25-19) $S_0 = 75.4$ mph (Exhibit 25-19) $S = 66.5$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Southbound					
Agency or Company	CAI		Junction	BonnieB_Exit					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1010$ ft $V_u = 2884$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4000	0.90	Level	4	0	0.980	1.00	4533	
Ramp	159	0.90	Level	4	0	0.980	1.00	180	
UpStream	2884	0.90	Level	4	0	0.980	1.00	3269	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.638$ using Equation (Exhibit 25-12) $V_{12} = 2959$ pc/h V_3 or $V_{av34} 1574$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	4533	Exhibit 25-14	7200	No
				$V_{FO} = V_F - V_R$	4353	Exhibit 25-14	7200	No	
				V_R	180	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2959	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 25.2$ (pc/mi/ln) $LOS = C$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.379$ (Exhibit 25-19) $S_R = 59.4$ mph (Exhibit 25-19) $S_0 = 74.6$ mph (Exhibit 25-19) $S = 63.9$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		US377_FTWorth_ent			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 670$ ft $V_u = 186$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5213	0.90	Level	3	0	0.985	1.00	5879	
Ramp	805	0.90	Level	3	0	0.985	1.00	908	
UpStream	186	0.90	Level	3	0	0.985	1.00	210	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.244$ using Equation (Exhibit 25-5) $V_{12} = 1433$ pc/h V_3 or $V_{av34} = 2223$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2351$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6787	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3259	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 27.3$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.382$ (Exhibit 25-19) $S_R = 59.3$ mph (Exhibit 25-19) $S_0 = 65.4$ mph (Exhibit 25-19) $S = 62.3$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		HOV_Corinth_entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1450 ft $V_D =$ 1310 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6381	0.90	Level	3	0	0.985	1.00	7196	
Ramp	319	0.90	Level	3	0	0.985	1.00	360	
UpStream									
DownStream	1310	0.90	Level	3	0	0.985	1.00	1477	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.312$ using Equation (Exhibit 25-5) $V_{12} = 2246$ pc/h V_3 or $V_{av34} = 2475$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2878$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7556	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3583	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 31.9$ (pc/mi/ln) LOS = D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.421$ (Exhibit 25-19) $S_R = 58.2$ mph (Exhibit 25-19) $S_0 = 65.1$ mph (Exhibit 25-19) $S = 61.5$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		US377_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} =$ 1250 ft $V_u =$ 805 veh/h			Terrain: Level $S_{FF} =$ 70.0 mph $S_{FR} =$ 40.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6018	0.90	Level	4	0	0.980	1.00	6820	
Ramp	1203	0.90	Level	4	0	0.980	1.00	1363	
UpStream	805	0.90	Level	4	0	0.980	1.00	912	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 3742 pc/h V_3 or V_{av34} 1539 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6820	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	5457	Exhibit 25-14	9600	No	
				V_R	1363	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3742	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 31.9 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.486 (Exhibit 25-19) $S_R =$ 56.4 mph (Exhibit 25-19) $S_0 =$ 74.7 mph (Exhibit 25-19) $S =$ 63.4 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Southbound					
Agency or Company	CAI		Junction	Teasley_ent					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1900$ ft $V_u = 1203$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4815	0.90	Level	3	0	0.985	1.00	5430	
Ramp	265	0.90	Level	3	0	0.985	1.00	299	
UpStream	1203	0.90	Level	3	0	0.985	1.00	1357	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.320$ using Equation (Exhibit 25-5) $V_{12} = 1737$ pc/h V_3 or $V_{av34} = 1846$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2172$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	5729	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2471	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 21.5$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.327$ (Exhibit 25-19) $S_R = 60.8$ mph (Exhibit 25-19) $S_0 = 65.9$ mph (Exhibit 25-19) $S = 63.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		US 77 Entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1520$ ft $V_u = 265$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5080	0.90	Level	3	0	0.985	1.00	5729	
Ramp	841	0.90	Level	3	0	0.985	1.00	948	
UpStream	265	0.90	Level	3	0	0.985	1.00	299	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.239$ using Equation (Exhibit 25-5) $V_{12} = 1367$ pc/h V_3 or $V_{av34} = 2181$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2291$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6677	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3239	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 27.2$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.380$ (Exhibit 25-19) $S_R = 59.3$ mph (Exhibit 25-19) $S_0 = 65.6$ mph (Exhibit 25-19) $S = 62.4$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM 2499 Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5921	0.90	Level	4	0	0.980	1.00	6710	
Ramp	664	0.90	Level	4	0	0.980	1.00	753	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 3350 pc/h V_3 or V_{av34} 1680 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6710	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	5957	Exhibit 25-14	9600	No	
				V_R	753	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3350	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 28.6 (pc/mi/ln) LOS = D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.431 (Exhibit 25-19) $S_R =$ 57.9 mph (Exhibit 25-19) $S_0 =$ 74.1 mph (Exhibit 25-19) $S =$ 65.1 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		HOV_Teasley_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 670 ft $V_D =$ 805 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5399	0.90	Level	4	0	0.980	1.00	6119	
Ramp	186	0.90	Level	4	0	0.980	1.00	211	
UpStream									
DownStream	805	0.90	Level	4	0	0.980	1.00	912	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.597$ using Equation (Exhibit 25-12) $V_{12} = 3740$ pc/h V_3 or V_{av34} 2379 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6119	Exhibit 25-14	7200	No
				$V_{FO} = V_F - V_R$	5908	Exhibit 25-14	7200	No	
				V_R	211	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3740	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 33.5$ (pc/mi/ln) $LOS = D$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.382$ (Exhibit 25-19) $S_R = 59.3$ mph (Exhibit 25-19) $S_0 = 72.1$ mph (Exhibit 25-19) $S = 63.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Swisher_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 3200$ ft $V_u = 389$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3250	0.90	Level	3	0	0.985	1.00	3665	
Ramp	646	0.90	Level	3	0	0.985	1.00	729	
UpStream	389	0.90	Level	3	0	0.985	1.00	439	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 2009$ pc/h V_3 or V_{av34} 828 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	3665	Exhibit 25-14	9600	No
					$V_{FO} = V_F - V_R$	2936	Exhibit 25-14	9600	No
					V_R	729	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2009	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 17.0$ (pc/mi/ln) $LOS = B$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.429$ (Exhibit 25-19) $S_R = 58.0$ mph (Exhibit 25-19) $S_0 = 76.8$ mph (Exhibit 25-19) $S = 65.2$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		HOVDenton_Exit			
Date Performed		2/26/2009		Jurisdiction		Hickory Creek			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1800 ft $V_D =$ 1212 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6895	0.90	Level	3	0	0.985	1.00	7776	
Ramp	522	0.90	Level	3	0	0.985	1.00	589	
UpStream									
DownStream	1212	0.90	Level	3	0	0.985	1.00	1367	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 3723$ pc/h V_3 or V_{av34} 2026 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7776	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	7187	Exhibit 25-14	9600	No	
				V_R	589	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3723	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 35.0$ (pc/mi/ln) $LOS = D$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.416$ (Exhibit 25-19) $S_R = 58.4$ mph (Exhibit 25-19) $S_0 = 73.5$ mph (Exhibit 25-19) $S = 64.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Swisher entrance			
Date Performed		2/26/2009		Jurisdiction		Hickory Creek			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1800$ ft $V_u = 522$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6373	0.90	Level	3	0	0.985	1.00	7187	
Ramp	1212	0.90	Level	3	0	0.985	1.00	1367	
UpStream	522	0.90	Level	0	0	1.000	1.00	580	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.186$ using Equation (Exhibit 25-5) $V_{12} = 1339$ pc/h V_3 or $V_{av34} = 2924$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 1787$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8554	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3154	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 26.3$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.372$ (Exhibit 25-19) $S_R = 59.6$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 60.5$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Denton entrance			
Date Performed		2/26/2009		Jurisdiction		Hickory Creek			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7585	0.90	Level	3	0	0.985	1.00	8554	
Ramp	619	0.90	Level	3	0	0.985	1.00	698	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.270$ using Equation (Exhibit 25-5) $V_{12} = 2309$ pc/h V_3 or $V_{av34} = 3122$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 3154$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9252	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3852	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 32.1$ (pc/mi/ln) $LOS = D$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.465$ (Exhibit 25-19) $S_R = 57.0$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 59.3$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Highland_Exit			
Date Performed		2/26/2009		Jurisdiction		Highland Village			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 3560$ ft $V_u = 619$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8204	0.90	Level	3	0	0.985	1.00	9252	
Ramp	150	0.90	Level	3	0	0.985	1.00	169	
UpStream	619	0.90	Level	3	0	0.985	1.00	698	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 4129$ pc/h V_3 or $V_{av34} = 2561$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9252	Exhibit 25-14	9600	No
					$V_{FO} = V_F - V_R$	9083	Exhibit 25-14	9600	No
					V_R	169	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4129	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 35.3$ (pc/mi/ln) $LOS = E$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.378$ (Exhibit 25-19) $S_R = 59.4$ mph (Exhibit 25-19) $S_0 = 70.7$ mph (Exhibit 25-19) $S = 65.2$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET											
General Information					Site Information						
Analyst		LWC		Freeway/Dir of Travel		Southbound					
Agency or Company		CAI		Junction		FM407_Exit					
Date Performed		2/26/2009		Jurisdiction		Lewisville					
Analysis Time Period		DHV		Analysis Year		2030					
Project Description Ramp Junction Analysis Northbound General Purpose Lanes											
Inputs											
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 4520 ft $V_D =$ 575 veh/h				
Conversion to pc/h Under Base Conditions											
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$			
Freeway	8054	0.90	Level	3	0	0.985	1.00	9083			
Ramp	522	0.90	Level	3	0	0.985	1.00	589			
UpStream											
DownStream	575	0.90	Level	3	0	0.985	1.00	648			
Merge Areas					Diverge Areas						
Estimation of v_{12}					Estimation of v_{12}						
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 4292$ pc/h V_3 or V_{av34} 2395 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)						
Capacity Checks					Capacity Checks						
		Actual	Capacity		LOS F?						
V_{FO}		Exhibit 25-7					V_F	9083	Exhibit 25-14	9600	No
							$V_{FO} = V_F - V_R$	8494	Exhibit 25-14	9600	No
							V_R	589	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area						
		Actual	Max Desirable		Violation?						
V_{R12}		Exhibit 25-7					V_{12}	4292	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)						
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 36.7$ (pc/mi/ln) $LOS = E$ (Exhibit 25-4)						
Speed Determination					Speed Determination						
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.416$ (Exhibit 25-19) $S_R = 58.4$ mph (Exhibit 25-19) $S_0 = 71.3$ mph (Exhibit 25-19) $S = 64.6$ mph (Exhibit 25-15)						

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		GardenRidge_ON			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7532	0.90	Level	3	0	0.985	1.00	8494	
Ramp	575	0.90	Level	3	0	0.985	1.00	648	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.276$ using Equation (Exhibit 25-5) $V_{12} = 2346$ pc/h V_3 or $V_{av34} = 3074$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 3094$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9142	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3742	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 31.2$ (pc/mi/ln) LOS = D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.446$ (Exhibit 25-19) $S_R = 57.5$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 59.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		ValleyRidge_Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} =$ 2800 ft $V_u =$ 575 veh/h			Terrain: Level $S_{FF} =$ 70.0 mph $S_{FR} =$ 40.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8107	0.90	Level	3	0	0.985	1.00	9143	
Ramp	336	0.90	Level	3	0	0.985	1.00	379	
UpStream	575	0.90	Level	3	0	0.985	1.00	648	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 0.436 using Equation (Exhibit 25-12) $V_{12} =$ 3403 pc/h V_3 or V_{av34} 1956 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7315	Exhibit 25-14	9600	No
					$V_{FO} = V_F - V_R$	6936	Exhibit 25-14	9600	No
					V_R	379	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	3403	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 29.0 (pc/mi/ln) $LOS =$ D (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.397 (Exhibit 25-19) $S_R =$ 58.9 mph (Exhibit 25-19) $S_0 =$ 73.1 mph (Exhibit 25-19) $S =$ 65.7 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM1171_Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 3300$ ft $V_u = 336$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7771	0.90	Level	3	0	0.985	1.00	8764	
Ramp	1071	0.90	Level	3	0	0.985	1.00	1208	
UpStream	336	0.90	Level	3	0	0.985	1.00	379	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 4502$ pc/h V_3 or $V_{av34} 2131$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8764	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	7556	Exhibit 25-14	9600	No	
				V_R	1208	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4502	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 38.5$ (pc/mi/ln) $LOS = E$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.472$ (Exhibit 25-19) $S_R = 56.8$ mph (Exhibit 25-19) $S_0 = 72.4$ mph (Exhibit 25-19) $S = 63.4$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		ValleyRidge_entrance			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6700	0.90	Level	3	0	0.985	1.00	7556	
Ramp	1601	0.90	Level	3	0	0.985	1.00	1806	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.131$ using Equation (Exhibit 25-5) $V_{12} = 993$ pc/h V_3 or $V_{av34} = 3281$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 2156$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9362	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	3962	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 32.4$ (pc/mi/ln) LOS = D (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.486$ (Exhibit 25-19) $S_R = 56.4$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 59.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Southbound					
Agency or Company	CAI		Junction	HOVBUS121_entrance					
Date Performed	2/26/2009		Jurisdiction	Lewisville					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1010$ ft $V_u = 1469$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8247	0.90	Level	3	0	0.985	1.00	9301	
Ramp	186	0.90	Level	3	0	0.985	1.00	210	
UpStream	1469	0.90	Level	0	0	1.000	1.00	1632	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.331$ using Equation (Exhibit 25-5) $V_{12} = 3078$ pc/h V_3 or $V_{av34} = 3111$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 3901$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9511	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	4579	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 40.4$ (pc/mi/ln) LOS = E (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.661$ (Exhibit 25-19) $S_R = 51.5$ mph (Exhibit 25-19) $S_0 = 63.4$ mph (Exhibit 25-19) $S = 56.9$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM3040_Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1300$ ft $V_u = 867$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9035	0.90	Level	3	0	0.985	1.00	10189	
Ramp	4008	0.90	Level	3	0	0.985	1.00	4520	
UpStream	867	0.90	Level	3	0	0.985	1.00	978	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.260$ using Equation (Exhibit 25-12) $V_{12} = 5464$ pc/h V_3 or $V_{av34} 1344$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8152	Exhibit 25-14	9600	No
				$V_{FO} = V_F - V_R$	3632	Exhibit 25-14	9600	No	
				V_R	4520	Exhibit 25-3	4100	Yes	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5464	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 37.7$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.770$ (Exhibit 25-19) $S_R = 48.4$ mph (Exhibit 25-19) $S_0 = 75.4$ mph (Exhibit 25-19) $S = 54.9$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET													
General Information					Site Information								
Analyst		LWC		Freeway/Dir of Travel		Southbound							
Agency or Company		CAI		Junction		HOVcorporate_Exit							
Date Performed		2/26/2009		Jurisdiction		Lewisville							
Analysis Time Period		DHV		Analysis Year		2030							
Project Description Ramp Junction Analysis Northbound General Purpose Lanes													
Inputs													
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1040$ ft $V_u = 4008$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h						
Conversion to pc/h Under Base Conditions													
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$					
Freeway	5027	0.90	Level	3	0	0.985	1.00	5669					
Ramp	283	0.90	Level	3	0	0.985	1.00	319					
UpStream	4008	0.90	Level	3	0	0.985	1.00	4520					
DownStream													
Merge Areas					Diverge Areas								
Estimation of v_{12}					Estimation of v_{12}								
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 2652$ pc/h V_3 or $V_{av34} 1508$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)								
Capacity Checks					Capacity Checks								
		Actual	Capacity		LOS F?								
V_{FO}		Exhibit 25-7					V_F	5669	Exhibit 25-14	9600	No		
							$V_{FO} = V_F - V_R$	5350	Exhibit 25-14	9600	No		
							V_R	319	Exhibit 25-3	2100	No		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area								
		Actual	Max Desirable		Violation?				Actual	Max Desirable		Violation?	
V_{R12}			Exhibit 25-7				V_{12}	2652	Exhibit 25-14	4400:All		No	
Level of Service Determination (if not F)					Level of Service Determination (if not F)								
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 24.8$ (pc/mi/ln) $LOS = C$ (Exhibit 25-4)								
Speed Determination					Speed Determination								
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.392$ (Exhibit 25-19) $S_R = 59.0$ mph (Exhibit 25-19) $S_0 = 75.3$ mph (Exhibit 25-19) $S = 66.0$ mph (Exhibit 25-15)								

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM3040_entrance			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4744	0.90	Level	3	0	0.985	1.00	5350	
Ramp	1805	0.90	Level	3	0	0.985	1.00	2036	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.591 using Equation (Exhibit 25-5) $V_{12} =$ 3165 pc/h V_3 or V_{av34} 2185 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7386	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	5201	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 42.0 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 0.989 (Exhibit 25-19) $S_R =$ 42.3 mph (Exhibit 25-19) $S_0 =$ 63.9 mph (Exhibit 25-19) $S =$ 47.0 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Frankford_Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6549	0.90	Level	3	0	0.985	1.00	7386	
Ramp	1548	0.90	Level	3	0	0.985	1.00	1746	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.495 using Equation (Exhibit 25-12) $V_{12} =$ 4538 pc/h V_3 or V_{av34} 2848 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 4686 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7386	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	5640	Exhibit 25-14	7200	No	
				V_R	1746	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	4538	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 40.1 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.520 (Exhibit 25-19) $S_R =$ 55.4 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 60.0 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Frankford_entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5001	0.90	Level	3	0	0.985	1.00	5640	
Ramp	911	0.90	Level	3	0	0.985	1.00	1027	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 3336$ pc/h V_3 or $V_{av34} = 2304$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6667	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	4363	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 35.9$ (pc/mi/ln) LOS = E (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.587$ (Exhibit 25-19) $S_R = 53.6$ mph (Exhibit 25-19) $S_0 = 63.4$ mph (Exhibit 25-19) $S = 56.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		SH 190 entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1340 ft $V_D =$ 566 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5912	0.90	Level	3	0	0.985	1.00	6667	
Ramp	4061	0.90	Level	3	0	0.985	1.00	4580	
UpStream									
DownStream	566	0.90	Level	0	0	1.000	1.00	629	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.555$ using Equation (Exhibit 25-5) $V_{12} = 3700$ pc/h V_3 or $V_{av34} = 2967$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 3967$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11247	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8547	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 60.6$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 20.291$ (Exhibit 25-19) $S_R = -498.1$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 415.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Southbound					
Agency or Company	CAI		Junction	Whitlock entrance					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} =$ 2890 ft $V_u =$ 929 veh/h			Terrain: Level $S_{FF} =$ 70.0 mph $S_{FR} =$ 40.0 mph Sketch (show lanes, L_A, L_D, V_R, V_l)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9610	0.90	Level	3	0	0.985	1.00	10838	
Ramp	867	0.90	Level	3	0	0.985	1.00	978	
UpStream	929	0.90	Level	0	0	1.000	1.00	1032	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ 0.235 using Equation (Exhibit 25-5) $V_{12} =$ 2546 pc/h V_3 or V_{av34} 4146 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 5438 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11816	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	6416	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 51.9 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 2.666 (Exhibit 25-19) $S_R =$ -4.6 mph (Exhibit 25-19) $S_0 =$ 61.1 mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		ValleyView_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2220$ ft $V_u = 779$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10468	0.90	Level	4	0	0.980	1.00	11864	
Ramp	832	0.90	Level	4	0	0.980	1.00	943	
UpStream	779	0.90	Level	4	0	0.980	1.00	883	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 5705$ pc/h V_3 or V_{av34} 3079 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 6464$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	11864	Exhibit 25-14	9600	Yes
					$V_{FO} = V_F - V_R$	10921	Exhibit 25-14	9600	Yes
					V_R	943	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5705	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 55.3$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.448$ (Exhibit 25-19) $S_R = 57.5$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 62.6$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Valwood entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9636	0.90	Level	3	0	0.985	1.00	10867	
Ramp	1035	0.90	Level	3	0	0.985	1.00	1167	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 0.211 using Equation (Exhibit 25-5) $V_{12} =$ 2296 pc/h V_3 or V_{av34} 4285 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 5467 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	12034	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	6634	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 53.5 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 3.247 (Exhibit 25-19) $S_R =$ -20.9 mph (Exhibit 25-19) $S_0 =$ 61.1 mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

MANAGED LANES

BUILD

SOUTHBOUND

LEVELS OF SERVICE HCS OUTPUT

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		GP Teasley Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1000$ ft $V_u = 265$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	229	0.90	Level	3	0	0.985	1.00	258	
Ramp	159	0.90	Level	3	0	0.985	1.00	179	
UpStream	265	0.90	Level	0	0	1.000	1.00	294	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 258$ pc/h V_3 or $V_{av34} 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	258	Exhibit 25-14	4800	No
					$V_{FO} = V_F - V_R$	79	Exhibit 25-14	4800	No
					V_R	179	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	258	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 2.0$ (pc/mi/ln) $LOS = A$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.379$ (Exhibit 25-19) $S_R = 59.4$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 59.4$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound Managed Lanes			
Agency or Company		CAI		Junction		GPL US 377 On			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	133	0.90	Level	4	0	0.980	1.00	151	
Ramp	186	0.90	Level	4	0	0.980	1.00	211	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 151$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	362	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	362	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 5.1$ (pc/mi/ln) LOS = A (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.287$ (Exhibit 25-19) $S_R = 62.0$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 62.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound Managed Lanes			
Agency or Company		CAI		Junction		US 77 On			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	319	0.90	Level	3	0	0.985	1.00	360	
Ramp	44	0.90	Level	3	0	0.985	1.00	50	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 360$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	410	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	410	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 5.5$ (pc/mi/ln) LOS = A (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.287$ (Exhibit 25-19) $S_R = 62.0$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 62.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound Managed Lanes			
Agency or Company		CAI		Junction		GPL_Teasly_On			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	70	0.90	Level	3	0	0.985	1.00	79	
Ramp	177	0.90	Level	3	0	0.985	1.00	200	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 79$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	279	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	279	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 4.4$ (pc/mi/ln) LOS = A (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.286$ (Exhibit 25-19) $S_R = 62.0$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 62.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		GP Corinth Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	726	0.90	Level	3	0	0.985	1.00	819	
Ramp	319	0.90	Level	3	0	0.985	1.00	360	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 819 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	819	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	459	Exhibit 25-14	4800	No	
				V_R	360	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	819	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 6.8 (pc/mi/ln) $LOS =$ A (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.395 (Exhibit 25-19) $S_R =$ 58.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound Managed Lanes			
Agency or Company		CAI		Junction		Swisher On			
Date Performed		2/26/2009		Jurisdiction		Lake Dallas			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1500$ ft $V_u = 319$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	407	0.90	Level	3	0	0.985	1.00	459	
Ramp	602	0.90	Level	3	0	0.985	1.00	679	
UpStream	319	0.90	Level	3	0	0.985	1.00	360	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 459$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	1138	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	1138	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 10.9$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.293$ (Exhibit 25-19) $S_R = 61.8$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.8$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound Managed Lanes			
Agency or Company		CAI		Junction		GPL Hundley On			
Date Performed		2/26/2009		Jurisdiction		Hickory Creek			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1500$ ft $V_u = 602$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1009	0.90	Level	3	0	0.985	1.00	1138	
Ramp	522	0.90	Level	3	0	0.985	1.00	589	
UpStream	602	0.90	Level	3	0	0.985	1.00	679	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 1138$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	1727	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	1727	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 15.5$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.303$ (Exhibit 25-19) $S_R = 61.5$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.5$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM 407 Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1531	0.90	Level	3	0	0.985	1.00	1727	
Ramp	540	0.90	Level	3	0	0.985	1.00	609	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1727 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1727	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	1118	Exhibit 25-14	4800	No	
				V_R	609	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1727	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 14.6 (pc/mi/ln) LOS = B (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.418 (Exhibit 25-19) $S_R =$ 58.3 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Lake Park Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_l)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1531	0.90	Level	3	0	0.985	1.00	1727	
Ramp	540	0.90	Level	3	0	0.985	1.00	609	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1727 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1727	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	1118	Exhibit 25-14	4800	No	
				V_R	609	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1727	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 14.6 (pc/mi/ln) LOS = B (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.418 (Exhibit 25-19) $S_R =$ 58.3 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Valley Ridge Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	991	0.90	Level	3	0	0.985	1.00	1118	
Ramp	106	0.90	Level	3	0	0.985	1.00	120	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1118 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1118	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	998	Exhibit 25-14	4800	No	
				V_R	120	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1118	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 9.4 (pc/mi/ln) LOS = A (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.374 (Exhibit 25-19) $S_R =$ 59.5 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 59.5 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound Managed Lanes			
Agency or Company		CAI		Junction		Valley Ridge On			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	885	0.90	Level	3	0	0.985	1.00	998	
Ramp	584	0.90	Level	3	0	0.985	1.00	659	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 998$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	1657	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	1657	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 15.0$ (pc/mi/ln) LOS = B (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.301$ (Exhibit 25-19) $S_R = 61.6$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		GPL Corporate Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1469	0.90	Level	3	0	0.985	1.00	1657	
Ramp	186	0.90	Level	3	0	0.985	1.00	210	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 1657 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	1657	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	1447	Exhibit 25-14	4800	No	
				V_R	210	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	1657	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 14.0 (pc/mi/ln) LOS = B (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.382 (Exhibit 25-19) $S_R =$ 59.3 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 59.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET											
General Information					Site Information						
Analyst		LWC		Freeway/Dir of Travel		Southbound					
Agency or Company		CAI		Junction		SH121_PGBT Exit					
Date Performed		2/26/2009		Jurisdiction		Lewisville					
Analysis Time Period		DHV		Analysis Year		2030					
Project Description Ramp Junction Analysis Southbound Managed Lanes											
Inputs											
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2250 ft $V_D =$ 283 veh/h				
Conversion to pc/h Under Base Conditions											
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$			
Freeway	1283	0.90	Level	3	0	0.985	1.00	1447			
Ramp	566	0.90	Level	3	0	0.985	1.00	638			
UpStream											
DownStream	283	0.90	Level	3	0	0.985	1.00	319			
Merge Areas					Diverge Areas						
Estimation of v_{12}					Estimation of v_{12}						
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ 1.000 using Equation (Exhibit 25-12) $P_{FD} =$ 1447 pc/h $V_{12} =$ 0 pc/h (Equation 25-15 or 25-16) V_3 or V_{av34} 0 pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)						
Capacity Checks					Capacity Checks						
		Actual	Capacity		LOS F?						
V_{FO}		Exhibit 25-7					V_F	1447	Exhibit 25-14	4800	No
							$V_{FO} = V_F - V_R$	809	Exhibit 25-14	4800	No
							V_R	638	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area						
		Actual	Max Desirable		Violation?						
V_{R12}		Exhibit 25-7					V_{12}	1447	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)						
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 12.2 (pc/mi/ln) $LOS =$ B (Exhibit 25-4)						
Speed Determination					Speed Determination						
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.420 (Exhibit 25-19) $S_R =$ 58.2 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.2 mph (Exhibit 25-15)						

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC			Freeway/Dir of Travel		Southbound Managed Lanes		
Agency or Company		CAI			Junction		Dickerson On		
Date Performed		2/26/2009			Jurisdiction				
Analysis Time Period		DHV			Analysis Year		2030		
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h		Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)					Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1000	0.90	Level	3	0	0.985	1.00	1128	
Ramp	1389	0.90	Level	3	0	0.985	1.00	1566	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 1128$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	2694	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2694	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 22.6$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.339$ (Exhibit 25-19) $S_R = 60.5$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 60.5$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Beltline Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2230 ft $V_D =$ 690 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	2389	0.90	Level	3	0	0.985	1.00	2694	
Ramp	1000	0.90	Level	3	0	0.985	1.00	1128	
UpStream									
DownStream	690	0.90	Level	3	0	0.985	1.00	778	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ 1.000 using Equation (Exhibit 25-12) $P_{FD} =$ 2694 pc/h $V_{12} =$ 0 pc/h (Equation 25-15 or 25-16) V_3 or V_{av34} 0 pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	2694	Exhibit 25-14	4800	No
				$V_{FO} = V_F - V_R$	1566	Exhibit 25-14	4800	No	
				V_R	1128	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	2694	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 22.9 (pc/mi/ln) $LOS =$ C (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.465 (Exhibit 25-19) $S_R =$ 57.0 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 57.0 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC			Freeway/Dir of Travel		Southbound Managed Lanes		
Agency or Company		CAI			Junction		Crosby On		
Date Performed		2/26/2009			Jurisdiction				
Analysis Time Period		DHV			Analysis Year		2030		
Project Description Ramp Junction Analysis for Managed Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h		Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)					Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	1389	0.90	Level	3	0	0.985	1.00	1566	
Ramp	690	0.90	Level	3	0	0.985	1.00	778	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 1566$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	2344	Exhibit 25-7		No	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	2344	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 20.3$ (pc/mi/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 0.322$ (Exhibit 25-19) $S_R = 61.0$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 61.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

FREEWAY LANES

NO-BUILD

NORTHBOUND

LEVELS OF SERVICE HCS OUTPUT

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC			Freeway/Dir of Travel		Northbound		
Agency or Company		CAI			Junction		Valley View Entrance		
Date Performed		2/26/2009			Jurisdiction				
Analysis Time Period		DHV			Analysis Year		2030		
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h		Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)					Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	13024	0.90	Level	3	0	0.985	1.00	14688	
Ramp	743	0.90	Level	3	0	0.985	1.00	838	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 8688$ pc/h V_3 or $V_{av34} = 6000$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 11988$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	15526	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	12826	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 102.0$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 1450.140$ (Exhibit 25-19) $S_R = -40533.9$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 353.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Valwood Exit			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2800$ ft $V_u = 743$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	13767	0.90	Level	3	0	0.985	1.00	15526	
Ramp	1177	0.90	Level	3	0	0.985	1.00	1327	
UpStream	743	0.90	Level	3	0	0.985	1.00	838	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 2560.76$ (Equation 25-8 or 25-9) $P_{FD} = 0.311$ using Equation (Exhibit 25-12) $V_{12} = 5740$ pc/h V_3 or $V_{av34} = 9786$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 12826$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	15526	Exhibit 25-14	7200	Yes
					$V_{FO} = V_F - V_R$	14199	Exhibit 25-14	7200	Yes
					V_R	1327	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5740	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 110.1$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.482$ (Exhibit 25-19) $S_R = 56.5$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 58.5$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Beltline Road _Off			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1100$ ft $V_u = 602$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12837	0.90	Level	3	0	0.985	1.00	14477	
Ramp	832	0.90	Level	3	0	0.985	1.00	938	
UpStream	602	0.90	Level	3	0	0.985	1.00	679	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.355$ using Equation (Exhibit 25-12) $V_{12} = 5743$ pc/h V_3 or $V_{av34} 8734$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 11777$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	14477	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	13539	Exhibit 25-14	7200	Yes	
				V_R	938	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5743	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 101.0$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.447$ (Exhibit 25-19) $S_R = 57.5$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 59.5$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Beltline Entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1700 ft $V_D =$ 1432 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12005	0.90	Level	3	0	0.985	1.00	13539	
Ramp	2053	0.90	Level	3	0	0.985	1.00	2315	
UpStream									
DownStream	1432	0.90	Level	3	0	0.985	1.00	1615	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ 9901.90 (Equation 25-2 or 25-3) $P_{FM} =$ 0.798 using Equation (Exhibit 25-5) $V_{12} =$ 10809 pc/h V_3 or V_{av34} 2730 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 10839 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	15854	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	13154	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 103.9 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 2012.959 (Exhibit 25-19) $S_R =$ -56292.8 mph (Exhibit 25-19) $S_0 =$ 61.1 mph (Exhibit 25-19) $S =$ 360.5 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		SandyLake/Whitlock_Off			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 2053$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	14058	0.90	Level	3	0	0.985	1.00	15854	
Ramp	1432	0.90	Level	3	0	0.985	1.00	1615	
UpStream	2053	0.90	Level	3	0	0.985	1.00	2315	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 7398.48$ (Equation 25-8 or 25-9) $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 15854$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	15854	Exhibit 25-14	7200	Yes
					$V_{FO} = V_F - V_R$	14239	Exhibit 25-14	7200	Yes
					V_R	1615	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	15854	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 136.1$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.508$ (Exhibit 25-19) $S_R = 55.8$ mph (Exhibit 25-19) $S_0 = 76.8$ mph (Exhibit 25-19) $S = 55.8$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Sandy Lake/Whitlock_ Entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2100$ ft $V_u = 1432$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12626	0.90	Level	3	0	0.985	1.00	14239	
Ramp	744	0.90	Level	3	0	0.985	1.00	839	
UpStream	1432	0.90	Level	3	0	0.985	1.00	1615	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 3138.49$ (Equation 25-2 or 25-3) $P_{FM} = 0.526$ using Equation (Exhibit 25-5) $V_{12} = 7487$ pc/h V_3 or $V_{av34} = 6752$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 11539$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	15078	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	12378	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 98.5$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 926.602$ (Exhibit 25-19) $S_R = -25874.9$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 344.8$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		DC to SH 190_Off			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} =$ 2500 ft $V_u =$ 744 veh/h			Terrain: Level $S_{FF} =$ 70.0 mph $S_{FR} =$ 40.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	13253	0.90	Level	3	0	0.985	1.00	14946	
Ramp	2229	0.90	Level	3	0	0.985	1.00	2514	
UpStream	744	0.90	Level	3	0	0.985	1.00	839	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ 3750.66 (Equation 25-8 or 25-9) $P_{FD} =$ 0.337 using Equation (Exhibit 25-12) $V_{12} =$ 6701 pc/h V_3 or V_{av34} 8245 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 12246 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	14946	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	12432	Exhibit 25-14	7200	Yes	
				V_R	2514	Exhibit 25-3	2100	Yes	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	6701	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 105.1 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.589 (Exhibit 25-19) $S_R =$ 53.5 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 55.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Frankford Road _Off			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1100 ft $V_D =$ 2707 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11024	0.90	Level	3	0	0.985	1.00	12433	
Ramp	796	0.90	Level	3	0	0.985	1.00	898	
UpStream									
DownStream	2707	0.90	Level	3	0	0.985	1.00	3053	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.408$ using Equation (Exhibit 25-12) $V_{12} = 5603$ pc/h V_3 or V_{av34} 6830 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 9733$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	12433	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	11535	Exhibit 25-14	7200	Yes	
				V_R	898	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5603	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 83.5$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.444$ (Exhibit 25-19) $S_R = 57.6$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 59.9$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		SH 190 EB Entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 2707 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12935	0.90	Level	3	0	0.985	1.00	14588	
Ramp	1143	0.90	Level	3	0	0.985	1.00	1289	
UpStream									
DownStream	2707	0.90	Level	3	0	0.985	1.00	3053	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 8629$ pc/h V_3 or $V_{av34} = 5959$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 11888$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	15877	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	13177	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 104.5$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 2059.787$ (Exhibit 25-19) $S_R = -57604.0$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 361.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		SH 190 WB Entrance			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_l)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 1143 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10228	0.90	Level	3	0	0.985	1.00	11535	
Ramp	2707	0.90	Level	3	0	0.985	1.00	3053	
UpStream									
DownStream	1143	0.90	Level	3	0	0.985	1.00	1289	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 6823$ pc/h V_3 or $V_{av34} = 4712$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 8835$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	14588	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	11888	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 93.7$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 567.770$ (Exhibit 25-19) $S_R = -15827.6$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 335.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Frankford On			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1000 ft $V_D =$ 3168 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	14078	0.90	Level	3	0	0.985	1.00	15877	
Ramp	744	0.90	Level	3	0	0.985	1.00	839	
UpStream									
DownStream	3168	0.90	Level	3	0	0.985	1.00	3573	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ 21906.80 (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 15877 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	16716	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	16716	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 132.3 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 70914.148 (Exhibit 25-19) $S_R =$ -1985526.1 mph (Exhibit 25-19) $S_0 =$ 70.0 mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		SH 121 Toll_Off-ramp			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 744$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	14822	0.90	Level	3	0	0.985	1.00	16716	
Ramp	3168	0.90	Level	3	0	0.985	1.00	3573	
UpStream	744	0.90	Level	3	0	0.985	1.00	839	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.450$ using Equation (Exhibit 25-12) $V_{12} = 9487$ pc/h V_3 or $V_{av34} 7229$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 14016$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	16716	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	13143	Exhibit 25-14	7200	Yes	
				V_R	3573	Exhibit 25-3	4100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9487	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 111.3$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.685$ (Exhibit 25-19) $S_R = 50.8$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 53.2$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		SH 121 Off-ramp			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1000$ ft $V_u = 3168$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11654	0.90	Level	3	0	0.985	1.00	13143	
Ramp	443	0.90	Level	3	0	0.985	1.00	500	
UpStream	3168	0.90	Level	3	0	0.985	1.00	3573	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.408$ using Equation (Exhibit 25-12) $V_{12} = 5664$ pc/h V_3 or $V_{av34} 7479$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 10443$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	13143	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	12643	Exhibit 25-14	7200	Yes	
				V_R	500	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5664	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 89.6$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.278$ (Exhibit 25-19) $S_R = 62.2$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 63.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		FM 3040 Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 1088 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11211	0.90	Level	3	0	0.985	1.00	12644	
Ramp	956	0.90	Level	3	0	0.985	1.00	1078	
UpStream									
DownStream	1088	0.90	Level	3	0	0.985	1.00	1227	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.394$ using Equation (Exhibit 25-12) $V_{12} = 5639$ pc/h V_3 or V_{av34} 7005 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 9944$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	12644	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	11566	Exhibit 25-14	7200	Yes	
				V_R	1078	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5639	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 85.3$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.460$ (Exhibit 25-19) $S_R = 57.1$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 59.5$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	SH 121 On					
Date Performed	2/26/2009		Jurisdiction	Lewisville					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis for No Build Northbound									
Inputs									
Upstream Adj Ramp			Terrain: Level				Downstream Adj Ramp		
☒ Yes ☐ On ☐ No ☒ Off							☐ Yes ☐ On ☒ No ☐ Off		
L _{up} = 1000 ft			S _{FF} = 70.0 mph S _{FR} = 40.0 mph				L _{down} = ft		
V _u = 956 veh/h			Sketch (show lanes, L _A , L _D , V _R , V _I)				V _D = veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF × f _{HV} × f _p	
Freeway	10225	0.90	Level	3	0	0.985	1.00	11532	
Ramp	1088	0.90	Level	3	0	0.985	1.00	1227	
UpStream	956	0.90	Level	3	0	0.985	1.00	1078	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ L _{EQ} = 2642.23 (Equation 25-2 or 25-3) P _{FM} = 0.488 using Equation (Exhibit 25-5) V ₁₂ = 5625 pc/h V ₃ or V _{av34} = 5907 pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☒ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☒ Yes ☐ No If Yes, V _{12a} = 8832 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 25-8 or 25-9) P _{FD} = using Equation (Exhibit 25-12) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	12759	Exhibit 25-7		Yes	V _F		Exhibit 25-14		
					V _{FO} = V _F - V _R		Exhibit 25-14		
					V _R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	10059	Exhibit 25-7	4600:All	No	V ₁₂		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 80.2 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = 91.405 (Exhibit 25-19)					D _S = (Exhibit 25-19)				
S _R = -2489.3 mph (Exhibit 25-19)					S _R = mph (Exhibit 25-19)				
S ₀ = 61.1 mph (Exhibit 25-19)					S ₀ = mph (Exhibit 25-19)				
S = 317.6 mph (Exhibit 25-14)					S = mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		FM 3040_Entrance			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2300$ ft $V_u = 1088$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11343	0.90	Level	3	0	0.985	1.00	12792	
Ramp	1088	0.90	Level	3	0	0.985	1.00	1227	
UpStream	1088	0.90	Level	3	0	0.985	1.00	1227	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 7566$ pc/h V_3 or $V_{av34} = 5226$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 10092$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	14019	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	11319	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 90.1$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 321.532$ (Exhibit 25-19) $S_R = -8932.9$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 326.4$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Corporate Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound Managed Lanes									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2500$ ft $V_u = 1088$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12431	0.90	Level	3	0	0.985	1.00	14019	
Ramp	1318	0.90	Level	3	0	0.985	1.00	1486	
UpStream	1088	0.90	Level	0	0	1.000	1.00	1209	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 14019$ pc/h V_3 or $V_{av34} 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	14019	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	12533	Exhibit 25-14	4800	Yes	
				V_R	1486	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	14019	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 120.3$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.497$ (Exhibit 25-19) $S_R = 56.1$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 56.1$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Corporate_on			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 2000 ft $V_D =$ 1203 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11113	0.90	Level	3	0	0.985	1.00	12533	
Ramp	787	0.90	Level	3	0	0.985	1.00	888	
UpStream									
DownStream	1203	0.90	Grade	3	0	0.985	1.00	1357	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ 8320.05 (Equation 25-2 or 25-3) $P_{FM} =$ 0.727 using Equation (Exhibit 25-5) $V_{12} =$ 9112 pc/h V_3 or V_{av34} 3421 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 9833 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	13421	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	10721	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 85.6 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 176.940 (Exhibit 25-19) $S_R =$ -4884.3 mph (Exhibit 25-19) $S_0 =$ 61.1 mph (Exhibit 25-19) $S =$ 319.4 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		BUS 121_ Off-ramp			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 778$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10032	0.90	Level	3	0	0.985	1.00	11314	
Ramp	690	0.90	Level	3	0	0.985	1.00	778	
UpStream	778	0.90	Level	3	0	0.985	1.00	877	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 3223.15$ (Equation 25-8 or 25-9) $P_{FD} = 0.805$ using Equation (Exhibit 25-12) $V_{12} = 9264$ pc/h V_3 or $V_{av34} = 2050$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	11314	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	10536	Exhibit 25-14	7200	Yes	
				V_R	778	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9264	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 79.4$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.303$ (Exhibit 25-19) $S_R = 61.5$ mph (Exhibit 25-19) $S_0 = 72.7$ mph (Exhibit 25-19) $S = 63.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		FM 1171 Exit			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1800 ft $V_D =$ 443 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11014	0.90	Level	3	0	0.985	1.00	12421	
Ramp	956	0.90	Level	3	0	0.985	1.00	1078	
UpStream									
DownStream	443	0.90	Level	3	0	0.985	1.00	500	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 0.400 using Equation (Exhibit 25-12) $V_{12} =$ 5614 pc/h V_3 or V_{av34} 6807 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 9721 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	12421	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	11343	Exhibit 25-14	7200	Yes	
				V_R	1078	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5614	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 83.4 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.460 (Exhibit 25-19) $S_R =$ 57.1 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 59.5 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Fox Entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1800 ft $V_D =$ 1743 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9802	0.90	Level	3	0	0.985	1.00	11054	
Ramp	443	0.90	Level	3	0	0.985	1.00	500	
UpStream									
DownStream	1743	0.90	Level	3	0	0.985	1.00	1966	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ 12053.96 (Equation 25-2 or 25-3) $P_{FM} =$ 0.836 using Equation (Exhibit 25-5) $V_{12} =$ 9238 pc/h V_3 or V_{av34} 1816 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11554	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9738	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 78.1 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 66.374 (Exhibit 25-19) $S_R =$ -1788.5 mph (Exhibit 25-19) $S_0 =$ 65.3 mph (Exhibit 25-19) $S =$ 516.2 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Valley_Ridge Entrance			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 690 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9254	0.90	Level	3	0	0.985	1.00	10436	
Ramp	778	0.90	Level	3	0	0.985	1.00	877	
UpStream									
DownStream	690	0.90	Level	3	0	0.985	1.00	778	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 6173$ pc/h V_3 or $V_{av34} = 4263$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 7736$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11313	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8613	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 69.1$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 21.732$ (Exhibit 25-19) $S_R = -538.5$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 400.9$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		FM1171 Entrance			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 690 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9254	0.90	Level	3	0	0.985	1.00	10436	
Ramp	778	0.90	Level	3	0	0.985	1.00	877	
UpStream									
DownStream	690	0.90	Level	3	0	0.985	1.00	778	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 6173$ pc/h V_3 or $V_{av34} = 4263$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 7736$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11313	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8613	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 69.1$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 21.742$ (Exhibit 25-19) $S_R = -538.8$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 400.8$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC			Freeway/Dir of Travel		Northbound		
Agency or Company		CAI			Junction		Valley_Ridge Entrance		
Date Performed		2/26/2009			Jurisdiction		Carrollton		
Analysis Time Period		DHV			Analysis Year		2030		
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 690$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9342	0.90	Level	3	0	0.985	1.00	10536	
Ramp	177	0.90	Level	3	0	0.985	1.00	200	
UpStream	690	0.90	Level	3	0	0.985	1.00	778	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 6232$ pc/h V_3 or $V_{av34} = 4304$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 7836$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	10736	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8036	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 64.9$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 12.323$ (Exhibit 25-19) $S_R = -275.0$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 716.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		LakePark_FM407_Off-ramp			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 778$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10032	0.90	Level	3	0	0.985	1.00	11314	
Ramp	690	0.90	Level	3	0	0.985	1.00	778	
UpStream	778	0.90	Level	3	0	0.985	1.00	877	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 3223.15$ (Equation 25-8 or 25-9) $P_{FD} = 0.805$ using Equation (Exhibit 25-12) $V_{12} = 9264$ pc/h V_3 or $V_{av34} = 2050$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	11314	Exhibit 25-14	7200	Yes
					$V_{FO} = V_F - V_R$	10536	Exhibit 25-14	7200	Yes
					V_R	778	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9264	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 79.4$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.303$ (Exhibit 25-19) $S_R = 61.5$ mph (Exhibit 25-19) $S_0 = 72.7$ mph (Exhibit 25-19) $S = 63.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Jones_St_Entrance			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 400$ ft $V_u = 690$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_l)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9342	0.90	Level	3	0	0.985	1.00	10536	
Ramp	177	0.90	Level	3	0	0.985	1.00	200	
UpStream	690	0.90	Level	3	0	0.985	1.00	778	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 2209.30$ (Equation 25-2 or 25-3) $P_{FM} = 0.477$ using Equation (Exhibit 25-5) $V_{12} = 5029$ pc/h V_3 or $V_{av34} = 5507$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 7836$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	10736	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8036	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 64.9$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 12.333$ (Exhibit 25-19) $S_R = -275.3$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 714.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	Lake Park Entrance					
Date Performed	2/26/2009		Jurisdiction	Lewisville					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2000$ ft $V_u = 177$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9519	0.90	Level	3	0	0.985	1.00	10735	
Ramp	1344	0.90	Level	3	0	0.985	1.00	1516	
UpStream	177	0.90	Level	3	0	0.985	1.00	200	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 6350$ pc/h V_3 or $V_{av34} = 4385$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 8035$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	12251	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9551	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 76.1$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 55.110$ (Exhibit 25-19) $S_R = -1473.1$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 324.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Garden Ridge _ Off-ramp			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 762 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10863	0.90	Level	3	0	0.985	1.00	12251	
Ramp	1256	0.90	Level	3	0	0.985	1.00	1416	
UpStream									
DownStream	762	0.90	Level	3	0	0.985	1.00	859	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.389$ using Equation (Exhibit 25-12) $V_{12} = 5626$ pc/h V_3 or V_{av34} 6625 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 9551$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	12251	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	10835	Exhibit 25-14	7200	Yes	
				V_R	1416	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5626	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 81.9$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.490$ (Exhibit 25-19) $S_R = 56.3$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 58.8$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Garden Ridge Blvd A_Entrance			
Date Performed		2/26/2009		Jurisdiction		Lewisville			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 400$ ft $V_u = 690$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_l)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9342	0.90	Level	3	0	0.985	1.00	10536	
Ramp	177	0.90	Level	3	0	0.985	1.00	200	
UpStream	690	0.90	Level	3	0	0.985	1.00	778	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 2209.30$ (Equation 25-2 or 25-3) $P_{FM} = 0.477$ using Equation (Exhibit 25-5) $V_{12} = 5029$ pc/h V_3 or $V_{av34} = 5507$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 7836$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	10736	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8036	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 64.9$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 12.333$ (Exhibit 25-19) $S_R = -275.3$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 714.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Denton Drive Exit			
Date Performed		2/26/2009		Jurisdiction		Hickory Creek			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General Purpose Lanes									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10359	0.90	Level	3	0	0.985	1.00	11683	
Ramp	1347	0.90	Level	3	0	0.985	1.00	1519	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.398 using Equation (Exhibit 25-12) $V_{12} =$ 5565 pc/h V_3 or V_{av34} 6118 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 8983 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	11683	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	10164	Exhibit 25-14	7200	Yes	
				V_R	1519	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5565	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 77.0 (pc/mi/ln) LOS = F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.500 (Exhibit 25-19) $S_R =$ 56.0 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 58.7 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Hundley Exit			
Date Performed		2/26/2009		Jurisdiction		Lake Dallas			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound General No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9012	0.90	Level	3	0	0.985	1.00	10164	
Ramp	1823	0.90	Level	3	0	0.985	1.00	2056	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 10164 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	10164	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	8108	Exhibit 25-14	4800	Yes	
				V_R	2056	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	10164	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 87.2 (pc/mi/ln) LOS = F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.548 (Exhibit 25-19) $S_R =$ 54.7 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 54.7 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Swisher Entrance			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 540 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7189	0.90	Level	3	0	0.985	1.00	8108	
Ramp	1398	0.90	Level	3	0	0.985	1.00	1577	
UpStream									
DownStream	540	0.90	Level	3	0	0.985	1.00	609	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 8108 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9685	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9685	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 77.2 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 62.962 (Exhibit 25-19) $S_R =$ -1692.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -1692.9 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Dobbs_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 2600 ft $V_D =$ 265 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8047	0.90	Level	3	0	0.985	1.00	9075	
Ramp	177	0.90	Level	3	0	0.985	1.00	200	
UpStream									
DownStream	265	0.90	Level	3	0	0.985	1.00	299	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 9075 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9275	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9275	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 74.6 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 41.886 (Exhibit 25-19) $S_R =$ -1102.8 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -1102.8 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Corinth_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2600$ ft $V_u = 177$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8224	0.90	Level	3	0	0.985	1.00	9275	
Ramp	265	0.90	Level	3	0	0.985	1.00	299	
UpStream	177	0.90	Level	3	0	0.985	1.00	200	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 9275$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9275	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	8976	Exhibit 25-14	4800	Yes
					V_R	299	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9275	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 79.5$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.390$ (Exhibit 25-19) $S_R = 59.1$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 59.1$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Corinth_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build_Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2700 ft $V_D =$ 265 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7959	0.90	Level	3	0	0.985	1.00	8976	
Ramp	584	0.90	Level	3	0	0.985	1.00	659	
UpStream									
DownStream	265	0.90	Level	3	0	0.985	1.00	299	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 8976 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9635	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9635	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 77.2 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 59.915 (Exhibit 25-19) $S_R =$ -1607.6 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -1607.6 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Post_Oak_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 3000$ ft $V_u = 584$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8543	0.90	Level	3	0	0.985	1.00	9635	
Ramp	1186	0.90	Level	3	0	0.985	1.00	1338	
UpStream	584	0.90	Level	3	0	0.985	1.00	659	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 9635$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9635	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	8297	Exhibit 25-14	4800	Yes	
				V_R	1338	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9635	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 82.6$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.483$ (Exhibit 25-19) $S_R = 56.5$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 56.5$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		PostOak_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build_Northbound									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2700$ ft $V_u = 1186$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7357	0.90	Level	3	0	0.985	1.00	8297	
Ramp	372	0.90	Level	3	0	0.985	1.00	420	
UpStream	1186	0.90	Level	3	0	0.985	1.00	1338	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 8297$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8717	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8717	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 70.1$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 24.094$ (Exhibit 25-19) $S_R = -604.6$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = -604.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Mayhill_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2200 ft $V_D =$ 1044 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7729	0.90	Level	3	0	0.985	1.00	8717	
Ramp	894	0.90	Level	3	0	0.985	1.00	1008	
UpStream									
DownStream	1044	0.90	Level	3	0	0.985	1.00	1177	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ 1.000 using Equation (Exhibit 25-12) $P_{FD} =$ 8717 pc/h $V_{12} =$ 0 pc/h (Equation 25-15 or 25-16) V_3 or V_{av34} 0 pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8717	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	7709	Exhibit 25-14	4800	Yes
					V_R	1008	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8717	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 74.7 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.454 (Exhibit 25-19) $S_R =$ 57.3 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 57.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Loop288_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2200$ ft $V_u = 894$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6835	0.90	Level	3	0	0.985	1.00	7708	
Ramp	1044	0.90	Level	3	0	0.985	1.00	1177	
UpStream	894	0.90	Level	3	0	0.985	1.00	1008	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 7708$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7708	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	6531	Exhibit 25-14	4800	Yes
					V_R	1177	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	7708	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 66.0$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.469$ (Exhibit 25-19) $S_R = 56.9$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 56.9$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Mayhill_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build_Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_l)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 894 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5791	0.90	Level	3	0	0.985	1.00	6531	
Ramp	787	0.90	Level	3	0	0.985	1.00	888	
UpStream									
DownStream	894	0.90	Level	3	0	0.985	1.00	1008	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 6531 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7419	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	7419	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 59.8 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 6.784 (Exhibit 25-19) $S_R =$ -119.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -119.9 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Loop 288 Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 500 ft $V_D =$ 894 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6578	0.90	Level	3	0	0.985	1.00	7419	
Ramp	894	0.90	Level	3	0	0.985	1.00	1008	
UpStream									
DownStream	894	0.90	Level	3	0	0.985	1.00	1008	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 7419 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8427	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8427	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 67.6 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 18.099 (Exhibit 25-19) $S_R =$ -436.8 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -436.8 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Northbound					
Agency or Company	CAI		Junction	US77_Exit					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 500$ ft $V_u = 894$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7472	0.90	Level	4	0	0.980	1.00	8468	
Ramp	894	0.90	Level	4	0	0.980	1.00	1013	
UpStream	894	0.90	Level	4	0	0.980	1.00	1013	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 8468$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8468	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	7455	Exhibit 25-14	4800	Yes	
				V_R	1013	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8468	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 72.6$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.454$ (Exhibit 25-19) $S_R = 57.3$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 57.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		US 77 Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1200 ft $V_D =$ 265 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6578	0.90	Level	3	0	0.985	1.00	7419	
Ramp	300	0.90	Level	3	0	0.985	1.00	338	
UpStream									
DownStream	265	0.90	Level	3	0	0.985	1.00	299	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 7419 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7757	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	7757	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 62.7 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 9.399 (Exhibit 25-19) $S_R =$ -193.2 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -193.2 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Teasley_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} =$ 1200 ft $V_u =$ 300 veh/h			Terrain: Level $S_{FF} =$ 70.0 mph $S_{FR} =$ 40.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6878	0.90	Level	4	0	0.980	1.00	7795	
Ramp	265	0.90	Level	4	0	0.980	1.00	300	
UpStream	300	0.90	Level	4	0	0.980	1.00	340	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 7795 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7795	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	7495	Exhibit 25-14	4800	Yes	
				V_R	300	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	7795	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 66.8 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.390 (Exhibit 25-19) $S_R =$ 59.1 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 59.1 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		Teasley_FM 2181_ Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_T)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 2000 ft $V_D =$ 770 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6613	0.90	Level	4	0	0.980	1.00	7495	
Ramp	867	0.90	Level	4	0	0.980	1.00	983	
UpStream									
DownStream	770	0.90	Level	4	0	0.980	1.00	873	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 7495 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8478	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8478	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 68.0 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 19.032 (Exhibit 25-19) $S_R =$ -462.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -462.9 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		FortWorth_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2000$ ft $V_u = 867$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7480	0.90	Level	4	0	0.980	1.00	8477	
Ramp	770	0.90	Level	4	0	0.980	1.00	873	
UpStream	867	0.90	Level	4	0	0.980	1.00	983	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 8477$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8477	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	7604	Exhibit 25-14	4800	Yes
					V_R	873	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8477	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 72.7$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.442$ (Exhibit 25-19) $S_R = 57.6$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 57.6$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		DC 35W _ Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build _ Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1200 ft $V_D =$ 380 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	3967	0.90	Level	4	0	0.980	1.00	4496	
Ramp	3026	0.90	Level	4	0	0.980	1.00	3429	
UpStream									
DownStream	380	0.90	Level	4	0	0.980	1.00	431	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 4496 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7925	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	7925	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 62.6 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 11.067 (Exhibit 25-19) $S_R =$ -239.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -239.9 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		OakStreet_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build_Northbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7126	0.90	Level	4	0	0.980	1.00	8076	
Ramp	380	0.90	Level	4	0	0.980	1.00	431	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 8076 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8507	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8507	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 68.5 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 19.583 (Exhibit 25-19) $S_R =$ -478.3 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -478.3 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Northbound			
Agency or Company		CAI		Junction		US380_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7506	0.90	Level	4	0	0.980	1.00	8507	
Ramp	1858	0.90	Level	4	0	0.980	1.00	2106	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 8507 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8507	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	6401	Exhibit 25-14	4800	Yes	
				V_R	2106	Exhibit 25-3	2100	Yes	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8507	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 72.9 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.553 (Exhibit 25-19) $S_R =$ 54.5 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 54.5 mph (Exhibit 25-15)				

FREEWAY LANES

NO-BUILD

SOUTHBOUND

LEVELS OF SERVICE HCS OUTPUT

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		US 380_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build_Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5817	0.90	Level	4	0	0.980	1.00	6593	
Ramp	1805	0.90	Level	4	0	0.980	1.00	2046	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 6593$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8639	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8639	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 68.8$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 22.307$ (Exhibit 25-19) $S_R = -554.6$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = -554.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Oak Street _ Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7622	0.90	Level	4	0	0.980	1.00	8638	
Ramp	327	0.90	Level	4	0	0.980	1.00	371	
UpStream									
DownStream									
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 8638 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8638	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	8267	Exhibit 25-14	4800	Yes	
				V_R	371	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8638	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 74.0 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.396 (Exhibit 25-19) $S_R =$ 58.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		DCtoIH35W_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7295	0.90	Level	4	0	0.980	1.00	8268	
Ramp	2884	0.90	Level	4	0	0.980	1.00	3269	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 8268 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8268	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	4999	Exhibit 25-14	4800	Yes	
				V_R	3269	Exhibit 25-3	2100	Yes	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8268	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 70.9 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.657 (Exhibit 25-19) $S_R =$ 51.6 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 51.6 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		DC_IH35W_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	4260	0.90	Level	4	0	0.980	1.00	4828	
Ramp	1177	0.90	Level	4	0	0.980	1.00	1334	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 4828$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	6162	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	6162	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 49.8$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 2.131$ (Exhibit 25-19) $S_R = 10.3$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 10.3$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		NTexas_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1800$ ft $V_u = 1495$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5437	0.90	Level	4	0	0.980	1.00	6162	
Ramp	79	0.90	Level	4	0	0.980	1.00	90	
UpStream	1495	0.90	Level	4	0	0.980	1.00	1694	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 6162$ pc/h V_3 or $V_{av34} 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	6162	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	6072	Exhibit 25-14	4800	Yes
					V_R	90	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	6162	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 52.7$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.371$ (Exhibit 25-19) $S_R = 59.6$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 59.6$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FtWorth_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build_Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_T)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 2000 ft $V_D =$ 1194 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6720	0.90	Level	4	0	0.980	1.00	7616	
Ramp	805	0.90	Level	4	0	0.980	1.00	912	
UpStream									
DownStream	1194	0.90	Level	4	0	0.980	1.00	1353	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 7616 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8528	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8528	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 68.4 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 19.993 (Exhibit 25-19) $S_R =$ -489.8 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -489.8 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Teasley_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2000$ ft $V_u = 805$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7526	0.90	Level	4	0	0.980	1.00	8529	
Ramp	1194	0.90	Level	4	0	0.980	1.00	1353	
UpStream	805	0.90	Level	4	0	0.980	1.00	912	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 8529$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8529	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	7176	Exhibit 25-14	4800	Yes
					V_R	1353	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8529	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 73.1$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.485$ (Exhibit 25-19) $S_R = 56.4$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 56.4$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Teasley_ Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_T)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1000 ft $V_D =$ 310 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6332	0.90	Level	4	0	0.980	1.00	7176	
Ramp	265	0.90	Level	4	0	0.980	1.00	300	
UpStream									
DownStream	310	0.90	Level	4	0	0.980	1.00	351	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 7176 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7476	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	7476	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 60.5 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 7.165 (Exhibit 25-19) $S_R =$ -130.6 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -130.6 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		US77_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build6598									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 265$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6598	0.90	Level	4	0	0.980	1.00	7478	
Ramp	310	0.90	Level	4	0	0.980	1.00	351	
UpStream	265	0.90	Level	4	0	0.980	1.00	300	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 7478$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7478	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	7127	Exhibit 25-14	4800	Yes
					V_R	351	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	7478	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 64.1$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.395$ (Exhibit 25-19) $S_R = 59.0$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 59.0$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		US 77 _ Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build _ Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 500 ft $V_D =$ 894 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6288	0.90	Level	4	0	0.980	1.00	7126	
Ramp	894	0.90	Level	4	0	0.980	1.00	1013	
UpStream									
DownStream	894	0.90	Level	4	0	0.980	1.00	1013	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 7126 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	8139	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8139	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 65.4 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 13.640 (Exhibit 25-19) $S_R =$ -311.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -311.9 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Southbound					
Agency or Company	CAI		Junction	Loop288_Exit					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 500$ ft $V_u = 894$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7172	0.90	Level	3	0	0.985	1.00	8088	
Ramp	894	0.90	Level	3	0	0.985	1.00	1008	
UpStream	894	0.90	Level	3	0	0.985	1.00	1008	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 8088$ pc/h V_3 or $V_{av34} 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	8088	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	7080	Exhibit 25-14	4800	Yes	
				V_R	1008	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	8088	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 69.3$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.454$ (Exhibit 25-19) $S_R = 57.3$ mph (Exhibit 25-19) $S_0 = N/A$ mph (Exhibit 25-19) $S = 57.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Mayhill_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2000$ ft $V_u = 894$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6278	0.90	Level	3	0	0.985	1.00	7080	
Ramp	664	0.90	Level	3	0	0.985	1.00	749	
UpStream	894	0.90	Level	3	0	0.985	1.00	1008	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 7080$ pc/h V_3 or $V_{av34} 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	7080	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	6331	Exhibit 25-14	4800	Yes	
				V_R	749	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	7080	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 60.6$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.430$ (Exhibit 25-19) $S_R = 57.9$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = 57.9$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Loop288 _ Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build _ Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2200 ft $V_D =$ 1018 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	5614	0.90	Level	3	0	0.985	1.00	6331	
Ramp	1354	0.90	Level	3	0	0.985	1.00	1527	
UpStream									
DownStream	1018	0.90	Level	3	0	0.985	1.00	1148	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 6331 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	7858	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	7858	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 62.9 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 10.368 (Exhibit 25-19) $S_R =$ -220.3 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -220.3 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM2499_ Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2200 ft $V_D =$ 1354 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	6968	0.90	Level	3	0	0.985	1.00	7858	
Ramp	1018	0.90	Level	3	0	0.985	1.00	1148	
UpStream									
DownStream	1354	0.90	Level	3	0	0.985	1.00	1527	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 7858$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9006	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9006	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 72.1$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 32.073$ (Exhibit 25-19) $S_R = -828.0$ mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S = -828.0$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Post_oak_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2700 ft $V_D =$ 1310 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	7986	0.90	Level	3	0	0.985	1.00	9006	
Ramp	345	0.90	Level	3	0	0.985	1.00	389	
UpStream									
DownStream	1310	0.90	Level	3	0	0.985	1.00	1477	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ 1.000 using Equation (Exhibit 25-12) $P_{FD} =$ 9006 pc/h $V_{12} =$ 0 pc/h (Equation 25-15 or 25-16) V_3 or V_{av34} 0 pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9006	Exhibit 25-14	4800	Yes
					$V_{FO} = V_F - V_R$	8617	Exhibit 25-14	4800	Yes
					V_R	389	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9006	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 77.2 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.398 (Exhibit 25-19) $S_R =$ 58.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		PostOak_Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8411	0.90	Level	3	0	0.985	1.00	9486	
Ramp	1310	0.90	Level	3	0	0.985	1.00	1477	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 1.000$ using Equation (Exhibit 25-5) $V_{12} = 9486$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	10963	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	10963	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 87.2$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 225.308$ (Exhibit 25-19) $S_R = -6238.6$ mph (Exhibit 25-19) $S_0 = N/A$ mph (Exhibit 25-19) $S = -6238.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Corinth_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2700 ft $V_D =$ 443 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8951	0.90	Level	3	0	0.985	1.00	10095	
Ramp	540	0.90	Level	3	0	0.985	1.00	609	
UpStream									
DownStream	443	0.90	Level	3	0	0.985	1.00	500	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ 1.000 using Equation (Exhibit 25-12) $V_{12} =$ 10095 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	10095	Exhibit 25-14	4800	Yes
				$V_{FO} = V_F - V_R$	9486	Exhibit 25-14	4800	Yes	
				V_R	609	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	10095	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 86.6 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.418 (Exhibit 25-19) $S_R =$ 58.3 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ 58.3 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Corinth_ Entrance			
Date Performed		3/23/09		Jurisdiction		Denton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build Southbound									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 2600 ft $V_D =$ 389 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8411	0.90	Level	3	0	0.985	1.00	9486	
Ramp	443	0.90	Level	3	0	0.985	1.00	500	
UpStream									
DownStream	389	0.90	Level	3	0	0.985	1.00	439	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 9486 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	9986	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9986	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 80.0 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 84.990 (Exhibit 25-19) $S_R =$ -2309.7 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -2309.7 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Denton entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9111	0.90	Level	3	0	0.985	1.00	10275	
Ramp	1699	0.90	Level	3	0	0.985	1.00	1916	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ 1.000 using Equation (Exhibit 25-5) $V_{12} =$ 10275 pc/h V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	12191	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	12191	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 96.5 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 768.602 (Exhibit 25-19) $S_R =$ -21450.9 mph (Exhibit 25-19) $S_0 =$ N/A mph (Exhibit 25-19) $S =$ -21450.9 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		GardenRidge_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{up} = ft V _u = veh/h			Terrain: Level S_{FF} = 70.0 mph S_{FR} = 50.0 mph Sketch (show lanes, L _A , L _D , V _R , V _I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off L _{down} = ft V _D = veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	10810	0.90	Level	3	0	0.985	1.00	12191	
Ramp	1230	0.90	Level	3	0	0.985	1.00	1387	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 25-2 or 25-3) P _{FM} = using Equation (Exhibit 25-5) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 25-8 or 25-9) P _{FD} = 0.391 using Equation (Exhibit 25-12) V ₁₂ = 5616 pc/h V ₃ or V _{av34} 6575 pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☒ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☒ Yes ☐ No If Yes, V _{12a} = 9491 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 25-7			V _F	12191	Exhibit 25-14	7200	Yes
					V _{FO} = V _F - V _R	10804	Exhibit 25-14	7200	Yes
					V _R	1387	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 25-7			V ₁₂	5616	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = 85.5 (pc/mi/ln) LOS = F (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = (Exhibit 25-19) S _R = mph (Exhibit 25-19) S ₀ = mph (Exhibit 25-19) S = mph (Exhibit 25-14)					D _S = 0.358 (Exhibit 25-19) S _R = 60.0 mph (Exhibit 25-19) S ₀ = 72.0 mph (Exhibit 25-19) S = 61.9 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		GardenRidge_entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2600$ ft $V_u = 522$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9580	0.90	Level	3	0	0.985	1.00	10804	
Ramp	575	0.90	Level	3	0	0.985	1.00	648	
UpStream	522	0.90	Level	0	0	1.000	1.00	580	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 2885.73$ (Equation 25-2 or 25-3) $P_{FM} = 0.573$ using Equation (Exhibit 25-5) $V_{12} = 6194$ pc/h V_3 or $V_{av34} = 4610$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 8104$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11452	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8752	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 70.3$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 24.932$ (Exhibit 25-19) $S_R = -628.1$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 378.2$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM 407_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2600$ ft $V_u = 575$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10155	0.90	Level	3	0	0.985	1.00	11453	
Ramp	522	0.90	Level	3	0	0.985	1.00	589	
UpStream	575	0.90	Level	3	0	0.985	1.00	648	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 2237.14$ (Equation 25-8 or 25-9) $P_{FD} = 0.447$ using Equation (Exhibit 25-12) $V_{12} = 5441$ pc/h V_3 or $V_{av34} = 6012$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 8753$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	11453	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	10864	Exhibit 25-14	7200	Yes	
				V_R	589	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5441	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 75.0$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.286$ (Exhibit 25-19) $S_R = 62.0$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 63.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Valley_Ridge_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	9093	0.90	Level	3	0	0.985	1.00	10255	
Ramp	442	0.90	Level	3	0	0.985	1.00	498	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.481 using Equation (Exhibit 25-12) $V_{12} =$ 5188 pc/h V_3 or V_{av34} 5067 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 7555 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	10255	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	9757	Exhibit 25-14	7200	Yes	
				V_R	498	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5188	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 64.7 (pc/mi/ln) LOS = F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.278 (Exhibit 25-19) $S_R =$ 62.2 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 64.1 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM1171_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 2190$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8651	0.90	Level	3	0	0.985	1.00	9756	
Ramp	1071	0.90	Level	3	0	0.985	1.00	1208	
UpStream	2190	0.90	Level	3	0	0.985	1.00	2470	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 12132.82$ (Equation 25-8 or 25-9) $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 9756$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	9756	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	8548	Exhibit 25-14	7200	Yes	
				V_R	1208	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9756	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 87.8$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.342$ (Exhibit 25-19) $S_R = 60.4$ mph (Exhibit 25-19) $S_0 = 76.8$ mph (Exhibit 25-19) $S = 59.8$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Valley_Ridge_entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2100 ft $V_D =$ 965 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	8023	0.90	Level	3	0	0.985	1.00	9048	
Ramp	2190	0.90	Level	3	0	0.985	1.00	2470	
UpStream									
DownStream	965	0.90	Level	0	0	1.000	1.00	1072	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 5352$ pc/h V_3 or $V_{av34} = 3696$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 6348$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	11518	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	8818	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 70.0$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 26.614$ (Exhibit 25-19) $S_R = -675.2$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 369.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		BUS 121 entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10549	0.90	Level	3	0	0.985	1.00	11897	
Ramp	1469	0.90	Level	3	0	0.985	1.00	1657	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 7037$ pc/h V_3 or $V_{av34} = 4860$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 9197$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	13554	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	10854	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 86.2$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 202.060$ (Exhibit 25-19) $S_R = -5587.7$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 320.7$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC			Freeway/Dir of Travel		Southbound		
Agency or Company		CAI			Junction		Corporate Exit		
Date Performed		2/26/2009			Jurisdiction				
Analysis Time Period		DHV			Analysis Year		2030		
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2000$ ft $V_u = 1469$ veh/h				Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A, L_D, V_R, V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h	
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12018	0.90	Level	3	0	0.985	1.00	13554	
Ramp	832	0.90	Level	3	0	0.985	1.00	938	
UpStream	1469	0.90	Level	3	0	0.985	1.00	1657	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 5320.21$ (Equation 25-8 or 25-9) $P_{FD} = 0.689$ using Equation (Exhibit 25-12) $V_{12} = 9628$ pc/h V_3 or $V_{av34} 3926$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 10854$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	13554	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	12616	Exhibit 25-14	7200	Yes	
				V_R	938	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	9628	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 97.8$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.317$ (Exhibit 25-19) $S_R = 61.1$ mph (Exhibit 25-19) $S_0 = 72.3$ mph (Exhibit 25-19) $S = 62.7$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Corporate_entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 2100 ft $V_D =$ 965 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11186	0.90	Level	3	0	0.985	1.00	12615	
Ramp	902	0.90	Level	3	0	0.985	1.00	1017	
UpStream									
DownStream	965	0.90	Level	0	0	1.000	1.00	1072	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ 6572.65 (Equation 25-2 or 25-3) $P_{FM} =$ 0.683 using Equation (Exhibit 25-5) $V_{12} =$ 8614 pc/h V_3 or V_{av34} 4001 pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 9915 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	13632	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	10932	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ 87.1 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ 218.429 (Exhibit 25-19) $S_R =$ -6046.0 mph (Exhibit 25-19) $S_0 =$ 61.1 mph (Exhibit 25-19) $S =$ 321.5 mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM 3040_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2300$ ft $V_u = 1221$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12088	0.90	Level	3	0	0.985	1.00	13633	
Ramp	867	0.90	Level	3	0	0.985	1.00	978	
UpStream	1221	0.90	Level	3	0	0.985	1.00	1377	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.374$ using Equation (Exhibit 25-12) $V_{12} = 5713$ pc/h V_3 or $V_{av34} 7920$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 10933$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	13633	Exhibit 25-14	7200	Yes
					$V_{FO} = V_F - V_R$	12655	Exhibit 25-14	7200	Yes
					V_R	978	Exhibit 25-3	2100	No
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5713	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 93.8$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.321$ (Exhibit 25-19) $S_R = 61.0$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 62.6$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		SH121_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 903 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11221	0.90	Level	3	0	0.985	1.00	12655	
Ramp	1221	0.90	Level	3	0	0.985	1.00	1377	
UpStream									
DownStream	903	0.90	Level	3	0	0.985	1.00	1018	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.380$ using Equation (Exhibit 25-12) $V_{12} = 5666$ pc/h V_3 or V_{av34} 6989 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 9955$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	12655	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	11278	Exhibit 25-14	7200	Yes	
				V_R	1377	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5666	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 89.6$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.357$ (Exhibit 25-19) $S_R = 60.0$ mph (Exhibit 25-19) $S_0 = 72.1$ mph (Exhibit 25-19) $S = 61.8$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		FM 3040 entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1000$ ft $V_u = 1221$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10000	0.90	Level	3	0	0.985	1.00	11278	
Ramp	903	0.90	Level	3	0	0.985	1.00	1018	
UpStream	1221	0.90	Level	0	0	1.000	1.00	1357	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 3066.34$ (Equation 25-2 or 25-3) $P_{FM} = 0.461$ using Equation (Exhibit 25-5) $V_{12} = 5200$ pc/h V_3 or $V_{av34} = 6078$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 8578$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	12296	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9596	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 76.7$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 57.624$ (Exhibit 25-19) $S_R = -1543.5$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 323.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		SH 121 entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 1000 ft $V_D =$ 3080 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10903	0.90	Level	3	0	0.985	1.00	12296	
Ramp	700	0.90	Level	3	0	0.985	1.00	789	
UpStream									
DownStream	3080	0.90	Level	0	0	1.000	1.00	3422	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 7273$ pc/h V_3 or $V_{av34} = 5023$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 9596$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	13085	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	10385	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 83.0$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 126.516$ (Exhibit 25-19) $S_R = -3472.4$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 317.4$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Southbound					
Agency or Company	CAI		Junction	SH 121 Toll entrance					
Date Performed	2/26/2009		Jurisdiction						
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis (No Build)									
Inputs									
Upstream Adj Ramp			Terrain: Level				Downstream Adj Ramp		
☐ Yes ☐ On ☒ No ☐ Off							☒ Yes ☐ On ☐ No ☒ Off		
L _{up} = ft			S _{FF} = 70.0 mph S _{FR} = 50.0 mph				L _{down} = 1000 ft		
V _u = veh/h			Sketch (show lanes, L _A , L _D , V _R , V _I)				V _D = 1548 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	11603	0.90	Level	3	0	0.985	1.00	13086	
Ramp	3080	0.90	Level	3	0	0.985	1.00	3474	
UpStream									
DownStream	1548	0.90	Level	0	0	1.000	1.00	1720	
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) L _{EQ} = P _{FM} = 0.555 using Equation (Exhibit 25-5) V ₁₂ = 7263 pc/h V ₃ or V _{av34} = 5823 pc/h (Equation 25-4 or 25-5) Is V ₃ or V _{av34} > 2,700 pc/h? ☒ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☒ Yes ☐ No If Yes, V _{12a} = 10386 pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) L _{EQ} = P _{FD} = using Equation (Exhibit 25-12) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 25-15 or 25-16) Is V ₃ or V _{av34} > 2,700 pc/h? ☐ Yes ☐ No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 ☐ Yes ☐ No If Yes, V _{12a} = pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	16560	Exhibit 25-7		Yes	V _F		Exhibit 25-14		
					V _{FO} = V _F - V _R		Exhibit 25-14		
					V _R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	13860	Exhibit 25-7	4600:All	No	V ₁₂		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 102.6 (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
M _S = 4077.597 (Exhibit 25-19)					D _S = (Exhibit 25-19)				
S _R = -114102.7 mph (Exhibit 25-19)					S _R = mph (Exhibit 25-19)				
S ₀ = 61.1 mph (Exhibit 25-19)					S ₀ = mph (Exhibit 25-19)				
S = 375.6 mph (Exhibit 25-14)					S = mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Frankford_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 1000$ ft $V_u = 3080$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 50.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	14683	0.90	Level	3	0	0.985	1.00	16559	
Ramp	1548	0.90	Level	3	0	0.985	1.00	1746	
UpStream	3080	0.90	Level	3	0	0.985	1.00	3474	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = 10884.79$ (Equation 25-8 or 25-9) $P_{FD} = 1.000$ using Equation (Exhibit 25-12) $V_{12} = 16559$ pc/h V_3 or $V_{av34} = 0$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☒ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	16559	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	14813	Exhibit 25-14	7200	Yes	
				V_R	1746	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	16559	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 149.3$ (pc/mi/ln) LOS = F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.390$ (Exhibit 25-19) $S_R = 59.1$ mph (Exhibit 25-19) $S_0 = 76.8$ mph (Exhibit 25-19) $S = 58.4$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		SB to EB_PGBT_Exit			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis SB-No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 1000 ft $V_D =$ 1089 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	13841	0.90	Level	3	0	0.985	1.00	15610	
Ramp	7134	0.90	Level	3	0	0.985	1.00	8046	
UpStream									
DownStream	1089	0.90	Level	3	0	0.985	1.00	1228	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.450$ using Equation (Exhibit 25-12) $V_{12} = 11450$ pc/h V_3 or $V_{av34} 4160$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 12910$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	15610	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	7564	Exhibit 25-14	7200	Yes	
				V_R	8046	Exhibit 25-3	4100	Yes	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	11450	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 101.8$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 1.087$ (Exhibit 25-19) $S_R = 39.6$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 42.8$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		SB_to_WB_PGBT_Exit			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 1000$ ft $V_u = 7134$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11168	0.90	Level	3	0	0.985	1.00	12595	
Ramp	1089	0.90	Level	3	0	0.985	1.00	1228	
UpStream	7134	0.90	Level	3	0	0.985	1.00	8046	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.389$ using Equation (Exhibit 25-12) $V_{12} = 5646$ pc/h V_3 or $V_{av34} 6949$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 9895$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	12595	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	11367	Exhibit 25-14	7200	Yes	
				V_R	1228	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5646	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 84.8$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.474$ (Exhibit 25-19) $S_R = 56.7$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 59.2$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Frankford Entrance			
Date Performed		2/26/2009		Jurisdiction					
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2100$ ft $V_u = 1432$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_l)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10079	0.90	Level	3	0	0.985	1.00	11367	
Ramp	911	0.90	Level	3	0	0.985	1.00	1027	
UpStream	1432	0.90	Level	3	0	0.985	1.00	1615	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 2564.12$ (Equation 25-2 or 25-3) $P_{FM} = 0.562$ using Equation (Exhibit 25-5) $V_{12} = 6389$ pc/h V_3 or $V_{av34} = 4978$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 8667$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	12394	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	9694	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 77.5$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 63.539$ (Exhibit 25-19) $S_R = -1709.1$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 321.6$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		PGBT_Entrance			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{down} =$ 2500 ft $V_D =$ 707 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	10990	0.90	Level	3	0	0.985	1.00	12394	
Ramp	2078	0.90	Level	3	0	0.985	1.00	2344	
UpStream									
DownStream	707	0.90	Level	3	0	0.985	1.00	797	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 4886.57$ (Equation 25-2 or 25-3) $P_{FM} = 0.632$ using Equation (Exhibit 25-5) $V_{12} = 7839$ pc/h V_3 or $V_{av34} = 4555$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 9694$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	14738	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	12038	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 95.2$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 659.609$ (Exhibit 25-19) $S_R = -18399.1$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 338.4$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Whitlock_Exit			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Northbound No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} =$ 2500 ft $V_u =$ 2078 veh/h			Terrain: Level $S_{FF} =$ 70.0 mph $S_{FR} =$ 40.0 mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	13068	0.90	Level	3	0	0.985	1.00	14738	
Ramp	707	0.90	Level	3	0	0.985	1.00	797	
UpStream	2078	0.90	Level	3	0	0.985	1.00	2344	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ using Equation (Exhibit 25-5) $P_{FM} =$ pc/h $V_{12} =$ pc/h (Equation 25-4 or 25-5) V_3 or V_{av34} pc/h Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ 6708.60 (Equation 25-8 or 25-9) $P_{FD} =$ 0.709 using Equation (Exhibit 25-12) $V_{12} =$ 10675 pc/h V_3 or V_{av34} 4063 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} =$ 12038 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	14738	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	13941	Exhibit 25-14	7200	Yes	
				V_R	797	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	10675	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 103.3 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.435 (Exhibit 25-19) $S_R =$ 57.8 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 59.8 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Whitlock Entrance			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12361	0.90	Level	3	0	0.985	1.00	13940	
Ramp	1433	0.90	Level	3	0	0.985	1.00	1616	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 8246$ pc/h V_3 or $V_{av34} = 5694$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 11240$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	15556	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	12856	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 101.9$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 1494.294$ (Exhibit 25-19) $S_R = -41770.2$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 354.3$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Beltline_Exit			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build exit									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	13794	0.90	Level	3	0	0.985	1.00	15557	
Ramp	1929	0.90	Level	3	0	0.985	1.00	2175	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ 0.271 using Equation (Exhibit 25-12) $V_{12} =$ 5802 pc/h V_3 or V_{av34} 9755 pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} =$ 12857 pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	15557	Exhibit 25-14	7200	Yes
				$V_{FO} = V_F - V_R$	13382	Exhibit 25-14	7200	Yes	
				V_R	2175	Exhibit 25-3	2100	Yes	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	5802	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ 110.3 (pc/mi/ln) $LOS =$ F (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S =$ 0.559 (Exhibit 25-19) $S_R =$ 54.4 mph (Exhibit 25-19) $S_0 =$ 70.2 mph (Exhibit 25-19) $S =$ 56.6 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		Belt Line Entrance			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{up} =$ ft $V_u =$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{down} =$ 2000 ft $V_D =$ 690 veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	11865	0.90	Level	3	0	0.985	1.00	13381	
Ramp	770	0.90	Level	3	0	0.985	1.00	868	
UpStream									
DownStream	690	0.90	Level	0	0	1.000	1.00	767	
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} = 0.591$ using Equation (Exhibit 25-5) $V_{12} = 7915$ pc/h V_3 or $V_{av34} = 5466$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 10681$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	14249	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	11549	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 92.0$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 404.607$ (Exhibit 25-19) $S_R = -11259.0$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 329.9$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	LWC		Freeway/Dir of Travel	Southbound					
Agency or Company	CAI		Junction	Valwood Pkwy Entrance					
Date Performed	2/26/2009		Jurisdiction	Carrollton					
Analysis Time Period	DHV		Analysis Year	2030					
Project Description Ramp Junction Analysis for No Build									
Inputs									
Upstream Adj Ramp ☒ Yes ☐ On ☐ No ☒ Off $L_{up} = 2200$ ft $V_u = 779$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_l)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	12546	0.90	Level	3	0	0.985	1.00	14149	
Ramp	1035	0.90	Level	3	0	0.985	1.00	1167	
UpStream	779	0.90	Level	0	0	1.000	1.00	866	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ $L_{EQ} = 3189.42$ (Equation 25-2 or 25-3) $P_{FM} = 0.529$ using Equation (Exhibit 25-5) $V_{12} = 7483$ pc/h V_3 or $V_{av34} = 6666$ pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☒ Yes ☐ No If Yes, $V_{12a} = 11449$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} =$ using Equation (Exhibit 25-12) $V_{12} =$ pc/h V_3 or $V_{av34} =$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 \times V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}	15316	Exhibit 25-7		Yes	V_F		Exhibit 25-14		
					$V_{FO} = V_F - V_R$		Exhibit 25-14		
					V_R		Exhibit 25-3		
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}	12616	Exhibit 25-7	4600:All	No	V_{12}		Exhibit 25-14		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R = 100.2$ (pc/mi/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R =$ (pc/mi/ln) LOS = (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S = 1175.513$ (Exhibit 25-19) $S_R = -32844.4$ mph (Exhibit 25-19) $S_0 = 61.1$ mph (Exhibit 25-19) $S = 349.5$ mph (Exhibit 25-14)					$D_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		LWC		Freeway/Dir of Travel		Southbound			
Agency or Company		CAI		Junction		ValleyView_Exit			
Date Performed		2/26/2009		Jurisdiction		Carrollton			
Analysis Time Period		DHV		Analysis Year		2030			
Project Description Ramp Junction Analysis Southbound No Build exit									
Inputs									
Upstream Adj Ramp ☒ Yes ☒ On ☐ No ☐ Off $L_{up} = 2800$ ft $V_u = 1035$ veh/h			Terrain: Level $S_{FF} = 70.0$ mph $S_{FR} = 40.0$ mph Sketch (show lanes, L_A , L_D , V_R , V_I)				Downstream Adj Ramp ☐ Yes ☐ On ☒ No ☐ Off $L_{down} =$ ft $V_D =$ veh/h		
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$	
Freeway	13582	0.90	Level	3	0	0.985	1.00	15317	
Ramp	843	0.90	Level	3	0	0.985	1.00	951	
UpStream	1035	0.90	Level	3	0	0.985	1.00	1167	
DownStream									
Merge Areas					Diverge Areas				
Estimation of v_{12}					Estimation of v_{12}				
$V_{12} = V_F (P_{FM})$ (Equation 25-2 or 25-3) $L_{EQ} =$ $P_{FM} =$ using Equation (Exhibit 25-5) $V_{12} =$ pc/h V_3 or V_{av34} pc/h (Equation 25-4 or 25-5) Is V_3 or $V_{av34} > 2,700$ pc/h? ☐ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☐ No If Yes, $V_{12a} =$ pc/h (Equation 25-8)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 25-8 or 25-9) $L_{EQ} =$ $P_{FD} = 0.436$ using Equation (Exhibit 25-12) $V_{12} = 7215$ pc/h V_3 or $V_{av34} 4051$ pc/h (Equation 25-15 or 25-16) Is V_3 or $V_{av34} > 2,700$ pc/h? ☒ Yes ☐ No Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ ☐ Yes ☒ No If Yes, $V_{12a} = 9917$ pc/h (Equation 25-18)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7			V_F	15317	Exhibit 25-14	9600	Yes
				$V_{FO} = V_F - V_R$	14366	Exhibit 25-14	9600	Yes	
				V_R	951	Exhibit 25-3	2100	No	
Flow Entering Merge Influence Area					Flow Entering Merge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7			V_{12}	7215	Exhibit 25-14	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/mi/ln) $LOS =$ (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$ $D_R = 85.0$ (pc/mi/ln) $LOS = F$ (Exhibit 25-4)				
Speed Determination					Speed Determination				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)					$D_S = 0.449$ (Exhibit 25-19) $S_R = 57.4$ mph (Exhibit 25-19) $S_0 = 70.2$ mph (Exhibit 25-19) $S = 61.4$ mph (Exhibit 25-15)				