

Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	JRE				Freeway/Dir of Travel	Int. 307 to 308 EB Weave			
Agency/Company	AECOM				Weaving Segment Location				
Date Performed	9/11/2014				Analysis Year	Alt D1 Ph II 2045			
Analysis Time Period	A.M. Peak Hour								
Project Description <i>Interstate 80 Reconstruction</i>									
Inputs									
Weaving configuration	One-Sided				Segment type	Freeway			
Weaving number of lanes, N	4				Freeway minimum speed, S_{MIN}	15			
Weaving segment length, L_S	2025ft				Freeway maximum capacity, C_{IFL}	2400			
Freeway free-flow speed, FFS	70 mph				Terrain type	Rolling			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2559	0.97	13	0	2.5	2.0	0.837	0.95	3319
V_{RF}	989	0.97	10	0	2.5	2.0	0.870	0.95	1234
V_{FR}	191	0.97	2	0	2.5	2.0	0.971	0.95	213
V_{RR}	91	0.97	13	0	2.5	2.0	0.837	0.95	3319
V_{NW}	3421							V =	4868
V_W	1447								
VR	0.297								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	1447 lc/h			
Interchange density, ID	1.70 int/mi				Weaving lane changes, LC_W	2021 lc/h			
Minimum RF lane changes, LC_{RF}	1 lc/pc				Non-weaving lane changes, LC_{NW}	1032 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	3053 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	0.312			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	4868 pc/h				Weaving intensity factor, W	0.312			
Weaving segment capacity, c_w	6419 veh/h				Weaving segment speed, S	54.6 mph			
Weaving segment v/c ratio	0.603				Average weaving speed, S_W	56.9 mph			
Weaving segment density, D	22.3 pc/mi/ln				Average non-weaving speed, S_{NW}	53.7 mph			
Level of Service, LOS	C				Maximum weaving length, L_{MAX}	5554 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	JRE				Freeway/Dir of Travel	Int. 307 to 308 EB Weave			
Agency/Company	AECOM				Weaving Segment Location				
Date Performed	9/11/2014				Analysis Year	Alt D1 Ph II 2045			
Analysis Time Period	P.M. Peak Hour								
Project Description <i>Interstate 80 Reconstruction</i>									
Inputs									
Weaving configuration	One-Sided				Segment type	Freeway			
Weaving number of lanes, N	4				Freeway minimum speed, S_{MIN}	15			
Weaving segment length, L_S	2025ft				Freeway maximum capacity, C_{IFL}	2400			
Freeway free-flow speed, FFS	70 mph				Terrain type	Rolling			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3370	0.97	13	0	2.5	2.0	0.837	0.95	4370
V_{RF}	725	0.97	10	0	2.5	2.0	0.870	0.95	905
V_{FR}	211	0.97	2	0	2.5	2.0	0.971	0.95	236
V_{RR}	110	0.97	13	0	2.5	2.0	0.837	0.95	4370
V_{NW}	4493							V =	5634
V_W	1141								
VR	0.203								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	1141 lc/h			
Interchange density, ID	1.70 int/mi				Weaving lane changes, LC_W	1715 lc/h			
Minimum RF lane changes, LC_{RF}	1 lc/pc				Non-weaving lane changes, LC_{NW}	1799 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	3514 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	0.349			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	5634 pc/h				Weaving intensity factor, W	0.349			
Weaving segment capacity, c_w	7015 veh/h				Weaving segment speed, S	55.2 mph			
Weaving segment v/c ratio	0.638				Average weaving speed, S_W	55.8 mph			
Weaving segment density, D	25.5 pc/mi/ln				Average non-weaving speed, S_{NW}	55.0 mph			
Level of Service, LOS	C				Maximum weaving length, L_{MAX}	4562 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

BASIC FREEWAY SEGMENTS WORKSHEET					
General Information			Site Information		
Analyst	JRE		Highway/Direction of Travel I-80 Westbound		
Agency or Company	AECOM		From/To Between Ints. 302 and 303		
Date Performed	9/11/2014		Jurisdiction		
Analysis Time Period	A.M. Peak Hour		Analysis Year Alt D1 Ph II 2045		
Project Description Interstate 80 Reconstruction					
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)		<input type="checkbox"/> Planning Data	
Flow Inputs					
Volume, V	2309	veh/h	Peak-Hour Factor, PHF	0.97	
AADT		veh/day	%Trucks and Buses, P _T	12	
Peak-Hr Prop. of AADT, K			%RVs, P _R	1	
Peak-Hr Direction Prop, D			General Terrain:	Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length	mi	
			Up/Down %		
Calculate Flow Adjustments					
f _p	0.95		E _R	2.0	
E _T	2.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.840	
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	12.0	ft			
Rt-Side Lat. Clearance	6.0	ft	f _{LW}	0.0	mph
Number of Lanes, N	2		f _{LC}	0.0	mph
Total Ramp Density, TRD	1.67	ramps/mi	TRD Adjustment	5.0	mph
FFS (measured)		mph	FFS	70.4	mph
Base free-flow Speed, BFFS	75.4	mph			
LOS and Performance Measures			Design (N)		
<u>Operational (LOS)</u>			<u>Design (N)</u>		
v _p = (V or DDHV) / (PHF x N x f _{HV})			Design LOS		
	1491	pc/h/ln	v _p = (V or DDHV) / (PHF x N x f _{HV})		
x f _p)			x f _p)		
S	69.0	mph	S		
D = v _p / S	21.6	pc/mi/ln	D = v _p / S		
LOS	C		Required Number of Lanes, N		
Glossary			Factor Location		
N - Number of lanes	S - Speed		E _R - Exhibits 11-10, 11-12	f _{LW} - Exhibit 11-8	
V - Hourly volume	D - Density		E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9	
v _p - Flow rate	FFS - Free-flow speed		f _p - Page 11-18	TRD - Page 11-11	
LOS - Level of service	BFFS - Base free-flow speed		LOS, S, FFS, v _p - Exhibits 11-2, 11-3		
DDHV - Directional design hour volume					

BASIC FREEWAY SEGMENTS WORKSHEET					
General Information			Site Information		
Analyst	JRE		Highway/Direction of Travel I-80 Westbound		
Agency or Company	AECOM		From/To Between Ints. 302 and 303		
Date Performed	9/11/2014		Jurisdiction		
Analysis Time Period	P.M. Peak Hour		Analysis Year Alt D1 Ph II 2045		
Project Description Interstate 80 Reconstruction					
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)		<input type="checkbox"/> Planning Data	
Flow Inputs					
Volume, V	4736	veh/h	Peak-Hour Factor, PHF	0.97	
AADT		veh/day	%Trucks and Buses, P _T	13	
Peak-Hr Prop. of AADT, K			%RVs, P _R	1	
Peak-Hr Direction Prop, D			General Terrain:	Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length	mi	
			Up/Down %		
Calculate Flow Adjustments					
f _p	0.95		E _R	2.0	
E _T	2.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.830	
Speed Inputs			Calc Speed Adj and FFS		
Lane Width	12.0	ft			
Rt-Side Lat. Clearance	6.0	ft	f _{LW}	0.0	mph
Number of Lanes, N	2		f _{LC}	0.0	mph
Total Ramp Density, TRD	1.67	ramps/mi	TRD Adjustment	5.0	mph
FFS (measured)		mph	FFS	70.4	mph
Base free-flow Speed, BFFS	75.4	mph			
LOS and Performance Measures			Design (N)		
<u>Operational (LOS)</u>			<u>Design (N)</u>		
v _p = (V or DDHV) / (PHF x N x f _{HV})			Design LOS		
	3097	pc/h/ln	v _p = (V or DDHV) / (PHF x N x f _{HV})		
x f _p)			x f _p)		
S	28.3	mph	S		
D = v _p / S	109.6	pc/mi/ln	D = v _p / S		
LOS	F		Required Number of Lanes, N		
Glossary			Factor Location		
N - Number of lanes	S - Speed		E _R - Exhibits 11-10, 11-12	f _{LW} - Exhibit 11-8	
V - Hourly volume	D - Density		E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9	
v _p - Flow rate	FFS - Free-flow speed		f _p - Page 11-18	TRD - Page 11-11	
LOS - Level of service	BFFS - Base free-flow speed		LOS, S, FFS, v _p - Exhibits 11-2, 11-3		
DDHV - Directional design hour volume					

Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	JRE				Freeway/Dir of Travel	Int. 304 to 303 WB Weave			
Agency/Company	AECOM				Weaving Segment Location				
Date Performed	9/11/2014				Analysis Year	Alt D1 Ph II 2045			
Analysis Time Period	A.M. Peak Hour								
Project Description <i>Interstate 80 Reconstruction</i>									
Inputs									
Weaving configuration	One-Sided				Segment type	Freeway			
Weaving number of lanes, N	2				Freeway minimum speed, S_{MIN}	15			
Weaving segment length, L_S	1000ft				Freeway maximum capacity, C_{IFL}	2400			
Freeway free-flow speed, FFS	70 mph				Terrain type	Rolling			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	1926	0.97	13	0	2.5	2.0	0.837	0.95	2498
V_{RF}	32	0.97	2	0	2.5	2.0	0.971	0.95	36
V_{FR}	68	0.97	2	0	2.5	2.0	0.971	0.95	76
V_{RR}	142	0.97	13	0	2.5	2.0	0.837	0.95	2498
V_{NW}	2657							V =	2769
V_W	112								
VR	0.040								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	112 lc/h			
Interchange density, ID	1.70 int/mi				Weaving lane changes, LC_W	203 lc/h			
Minimum RF lane changes, LC_{RF}	1 lc/pc				Non-weaving lane changes, LC_{NW}	704 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	907 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	0.209			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	2769 pc/h				Weaving intensity factor, W	0.209			
Weaving segment capacity, c_w	3576 veh/h				Weaving segment speed, S	62.5 mph			
Weaving segment v/c ratio	0.616				Average weaving speed, S_W	60.5 mph			
Weaving segment density, D	22.2 pc/mi/ln				Average non-weaving speed, S_{NW}	62.5 mph			
Level of Service, LOS	C				Maximum weaving length, L_{MAX}	2971 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	JRE				Freeway/Dir of Travel	Int. 304 to 303 WB Weave			
Agency/Company	AECOM				Weaving Segment Location				
Date Performed	9/11/2014				Analysis Year	Alt D1 Ph II 2045			
Analysis Time Period	P.M. Peak Hour								
Project Description <i>Interstate 80 Reconstruction</i>									
Inputs									
Weaving configuration	One-Sided				Segment type	Freeway			
Weaving number of lanes, N	2				Freeway minimum speed, S_{MIN}	15			
Weaving segment length, L_S	1600ft				Freeway maximum capacity, C_{IFL}	2400			
Freeway free-flow speed, FFS	70 mph				Terrain type	Rolling			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4233	0.97	13	0	2.5	2.0	0.837	0.95	5489
V_{RF}	73	0.97	2	0	2.5	2.0	0.971	0.95	82
V_{FR}	57	0.97	2	0	2.5	2.0	0.971	0.95	64
V_{RR}	196	0.97	13	0	2.5	2.0	0.837	0.95	5489
V_{NW}	5708							V =	5854
V_W	146								
VR	0.025								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	lc/h			
Interchange density, ID	1.70 int/mi				Weaving lane changes, LC_W	lc/h			
Minimum RF lane changes, LC_{RF}	1 lc/pc				Non-weaving lane changes, LC_{NW}	lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}				
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	5854 pc/h				Weaving intensity factor, W				
Weaving segment capacity, c_w	3666 veh/h				Weaving segment speed, S	mph			
Weaving segment v/c ratio	1.269				Average weaving speed, S_W	mph			
Weaving segment density, D	pc/mi/ln				Average non-weaving speed, S_{NW}	mph			
Level of Service, LOS	F				Maximum weaving length, L_{MAX}	2826 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	JRE				Freeway/Dir of Travel	Int. 307 to 308 EB Weave			
Agency/Company	AECOM				Weaving Segment Location				
Date Performed	9/11/2014				Analysis Year	Alt D1 Ph II 2045			
Analysis Time Period	A.M. Peak Hour								
Project Description <i>Interstate 80 Reconstruction</i>									
Inputs									
Weaving configuration	One-Sided				Segment type	Freeway			
Weaving number of lanes, N	4				Freeway minimum speed, S_{MIN}	15			
Weaving segment length, L_S	2200ft				Freeway maximum capacity, C_{IFL}	2400			
Freeway free-flow speed, FFS	70 mph				Terrain type	Rolling			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2198	0.97	13	0	2.5	2.0	0.837	0.95	2850
V_{RF}	329	0.97	10	0	2.5	2.0	0.870	0.95	411
V_{FR}	569	0.97	2	0	2.5	2.0	0.971	0.95	636
V_{RR}	65	0.97	13	0	2.5	2.0	0.837	0.95	2850
V_{NW}	2923							V =	3970
V_W	1047								
VR	0.264								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	1047 lc/h			
Interchange density, ID	1.70 int/mi				Weaving lane changes, LC_W	1649 lc/h			
Minimum RF lane changes, LC_{RF}	1 lc/pc				Non-weaving lane changes, LC_{NW}	1024 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	2673 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	0.264			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	3970 pc/h				Weaving intensity factor, W	0.264			
Weaving segment capacity, c_w	6904 veh/h				Weaving segment speed, S	57.9 mph			
Weaving segment v/c ratio	0.457				Average weaving speed, S_W	58.5 mph			
Weaving segment density, D	17.1 pc/mi/ln				Average non-weaving speed, S_{NW}	57.7 mph			
Level of Service, LOS	B				Maximum weaving length, L_{MAX}	5198 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	JRE				Freeway/Dir of Travel	Int. 308 to 307 WB Weave			
Agency/Company	AECOM				Weaving Segment Location				
Date Performed	9/11/2014				Analysis Year	Alt D1 Ph II 2045			
Analysis Time Period	P.M. Peak Hour								
Project Description <i>Interstate 80 Reconstruction</i>									
Inputs									
Weaving configuration	One-Sided				Segment type	Freeway			
Weaving number of lanes, N	4				Freeway minimum speed, S_{MIN}	15			
Weaving segment length, L_S	2200ft				Freeway maximum capacity, C_{IFL}	2400			
Freeway free-flow speed, FFS	70 mph				Terrain type	Rolling			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4803	0.97	13	0	2.5	2.0	0.837	0.95	6229
V_{RF}	373	0.97	2	0	2.5	2.0	0.971	0.95	417
V_{FR}	1157	0.97	10	0	2.5	2.0	0.870	0.95	1444
V_{RR}	132	0.97	13	0	2.5	2.0	0.837	0.95	6229
V_{NW}	6377							V =	8238
V_W	1861								
VR	0.226								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	1861 lc/h			
Interchange density, ID	1.70 int/mi				Weaving lane changes, LC_W	2463 lc/h			
Minimum RF lane changes, LC_{RF}	1 lc/pc				Non-weaving lane changes, LC_{NW}	3111 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	5574 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	0.471			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	8238 pc/h				Weaving intensity factor, W	0.471			
Weaving segment capacity, c_w	6999 veh/h				Weaving segment speed, S	47.9 mph			
Weaving segment v/c ratio	0.936				Average weaving speed, S_W	52.4 mph			
Weaving segment density, D	43.0 pc/mi/ln				Average non-weaving speed, S_{NW}	46.7 mph			
Level of Service, LOS	E				Maximum weaving length, L_{MAX}	4803 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									