

APPENDIX K

2020 & 2040 Build 1 Freeway HCS Operational Analysis

		F	REEWAY	WEAV	ING WOF	RKSHEE	Г				
General	Informatio	on			Site Info	rmation					
Analyst Agency/Com Date Perforr Analysis Tim	Analyst Agency/Company AECOM Date Performed Analysis Time Period AM					Freeway/Dir of TravelI-95 NBWeaving Segment LocationSeg 1-Bet Copans & SampleAnalysis Year2020 Build 1					
Project Desc	cription SW 10th	n Street SIMR									
Inputs											
Weaving cor Weaving nu Weaving seg Freeway free	nfiguration mber of lanes, N gment length, L _s e-flow speed, FF	One-Sided 4 2380ft 70 mph	Segment typ Freeway min Freeway ma Terrain type	e imum speed, ximum capac	, S _{MIN} ity, C _{IFL}		Freeway 15 2400 Level				
Convers	sions to po	/h Unde	r Base Co	ondition	s		1		1		
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)		
V _{FF}	4435	0.95	3	0	1.5	1.2	0.985	1.00	4738		
V _{RF}	345	0.92	2	0	1.5	1.2	0.990	1.00	379		
V _{FR}	810	0.92	2	0	1.5	1.2	0.990	1.00	889		
V _{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0		
V _{NW}	4738							V =	6006		
V _w	1268							-			
VR	0.211										
Configu	ration Cha	racterist	ics		•						
Minimum ma	aneuver lanes, N	√ _{WL}		2 lc	Minimum we	aving lane cl	nanges, LC _{MIN}		1268 lc/h		
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC_w				1703 lc/h		
Minimum RI	F lane changes,	LC _{RF}		1 lc/pc	Non-weaving lane changes, LC _{NW}				1496 lc/h		
Minimum FF	R lane changes,	LC _{FR}		1 lc/pc	Total lane ch	nanges, LC _{ALI}	L		3199 lc/h		
Minimum RI	R lane changes,	LC _{RR}		lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		789		
Weaving	g Segment	Speed,	Density, I	_evel of	Service,	and Cap	oacity				
Weaving se Weaving se	gment flow rate, gment capacity,	V C	:	5924 veh/h 8772 veh/h	Weaving inte Weaving seg	ensity factor, gment speed	W , S		0.285 54.5 mph		
Weaving se	gment v/c ratio	W		0.675	Average wea	aving speed,	S _w		57.8 mph		
Weaving se	gment density, D)	27	7.6 pc/mi/ln	Average nor	n-weaving sp	eed, S _{NW}		53.7 mph		
Level of Ser	vice, LOS			С	Maximum we	eaving length	i, L _{max}		4650 ft		
Notes					•						
a. Weaving se Chapter 13, " b. For volume	egments longer th Freeway Merge a es that exceed the	an the calcula nd Diverge Se weaving segr	ted maximum le gments". nent capacity, tl	ength should I ne level of sei	be treated as is rvice is "F".	olated merge	and diverge ar	eas using the	procedures of		

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst			Highway/Direction of Travel	1-95 NB	
Agency or Company	AECOM		From/To	Seg 2-Bo	et On & On from
Date Performed Analysis Time Period	AM		Jurisdiction Analysis Year	2020 Bu	ild 1
Project Description SW 10t	h Street SIMR				
✓ Oper.(LOS)			Des.(N)	Pla	inning Data
Flow Inputs					
Volume, V AADT	4780	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustr	ments				
f _n	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	3		f _{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph			r.
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1702 67.1 25.4 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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Job: SW 10th Street SIMR Analyst: AECOM



<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,443	0.67	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,107	0.71	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,329	0.63	No

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst			Highway/Direction of Travel	1-95 NB	at On from Sampla 8
Agency or Company	AECOM		From/To	Exp	
Date Performed Analysis Time Period	AM		Jurisdiction Analysis Year	2020 Bul	ild 1
Project Description SW 10th	n Street SIMR				
Oper.(LOS)			Des.(N)	Pla	nning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K	6030	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R	0.95 3 0	
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade 0.00% Length Up/Down %	Grade 0.00mi 0.00	
Calculate Flow Adjustn	nents				
f _p	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	S	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	4		f _{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph			
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	(f _{HV} x f _p) 1611 68.0 23.7 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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General Infor	mation			Site Infor	mation				
Analyst	nation		Fr	eeway/Dir of Tr	avel	95 NR			
Agonov or Company		<u>om</u>		notion	avei I-95 NB				
Date Performed	ALCO			risdiction	6	eg 5-011 ilui	псхр		
Analysis Time Period	АМ		Ar	alvsis Year	2	020 Build 1			
Project Description	SW 10th Stree	t SIMR			L	020 Dalla 1			
Inputs									
Instroam Adi Damp		Freeway Num	ber of Lanes, N	4				Downet	ioom Adi
Spstream Auj Namp		Ramp Numbe	r of Lanes, N	1				Ramp	ean Auj
🗌 Yes 🛛 🗌 Or	I	Acceleration I	ane Length L.	1500					
		Deceleration	ane Length L	1000				I Yes	L On
✓ No Of	÷			c020				🗌 No	✓ Off
= #			me, v _F	0030				I. =	6200 ft
up n		Ramp volume	e, v _R	890				-down	0200 11
veh/h		Freeway Free	-Flow Speed, S _{FF}	70.0				V _D =	1070 veh/h
		Ramp Free-Fl	ow Speed, S _{FR}	50.0				D	
Conversion t	<u>ס pc/h Une pc/h Une</u>	<u>der Base</u>	Conditions		r				
(pc/h)	v (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/Pł	HF x f _{HV} x f _p
Freeway	6030	0.95	Level	3	0	0.985	1.00		6443
Ramp	890	0.92	Level	2	0	0.990	1.00		977
UpStream									
DownStream	1070	0.92	Level	2	0	0.990	1.00		1175
		Merge Areas					Diverge Areas	;	
Estimation of	v ₁₂				Estimatio	on of v ₁₂	?		
	V ₁₂ = V _F	(P _{FM})				V	= V + (V - V)		
-FO =	(Equ	ation 13-6 o	⁻ 13-7)		_	v 12	$2 = V_R + (V_F = V_R)$	'R/'FD	12)
2. 2	0.096	using Equat	ion (Exhibit 13-6)		EQ -			3-12 UI 13	-13)
/=	616 n	c/b	(_/		P _{FD} =		using Equat	tion (Exhibit	13-7)
* 12	2013	o/h (Equati	on 13 14 or 13		V ₁₂ =		pc/h		
V ₃ or V _{av34}	17)		01110-14 01 10-		$V_3^{}$ or $V_{av34}^{}$		pc/h (Equatior	n 13-14 or 13	-17)
Is V_3 or $V_{2y34} > 2,70$	0 pc/h? 🗸 Ye	s 🗌 No			Is V_3 or V_{av34}	> 2,700 pc/ł	י? 🗌 Yes 🗌 N	0	
Is V_ or V > 1.5 '					Is V_3 or V_{av34}	> 1.5 * V ₁₂ /2	2 □Yes □N	0	
av34	2577	nc/h (Equati	on 13-16 13-			12	pc/h (Equat	ion 13-16,	13-18, or
f Yes,V _{12a} =	18, or	13-19)	511 15-16, 15-		12a -		13-19)		
Capacity Che	cks				Capacity	Checks			
	Actual	C	apacity	LOS F?		Act	ual C	Capacity	LOS F?
					V _F		Exhibit 1	3-8	
Vro	7420	Exhibit 13-8		No	$V_{FO} = V_{F}$ -	V _R	Exhibit 1	3-8	
FO	1120						Exhibit 1	3-	
					۷R		10		
Flow Entering	<u> Merge In</u>	fluence A	rea		Flow Ent	ering Di	verge Influe	ence Are	a
	Actual	Max	Desirable	Violation?		Actual	Max De	esirable	Violation?
	3863	Exhibit 13-8	4600:All	No	V ₁₂		Exhibit 13-8		
V _{R12}	ice Detern	nination (if not F)		Level of	Service	Determinati	ion (if no	ot F)
V _{R12} Level of Serv	a aa== :	0 0078 V 0 /	JU627 L		D	_R = 4.252	+ 0.0086 V ₁₂ -	0.009 L _D	
V _{R12} Level of Serv D _R = 5.475 +	0.00734 v _R + (12 0.	~			/mi/ln)			
V _{R12} Level of Serv D _R = 5.475 + D _R = 27.4 (pc/m	0.00734 v _R + (i/ln)	12	ň		$\nu_{\rm R}$ – (pc	*****			
V_{R12} Level of Serv $D_{R} = 5.475 + 27.4 \text{ (pc/m)}$ $O_{R} = C \text{ (Exhibit)}$	0.00734 v _R + (i/ln) 13-2)	12 0.	~		LOS = (E)	(hibit 13-2)	1		
V_{R12} $D_R = 5.475 + D_R = 27.4 (pc/m)$ $OS = C (Exhibit)$ $Speed Determ$	0.00734 v _R + (i/ln) 13-2) 1ination		~		LOS = (PC Speed D	(hibit 13-2) (hibit 13-2)	ntion		
V_{R12} Level of Serv $D_R = 5.475 +$ $D_R = 27.4 (pc/m)$ LOS = C (Exhibit Speed Detern $M_0 = 0.357 (Evil)$	0.00734 v _R + (i/ln) 13-2) 1ination vit 13-11)		-		D _R - (pc LOS = (E) Speed D D _s = (Ex	(hibit 13-2) e termina hibit 13-12)	ntion		
V_{R12} $D_R = 5.475 + D_R = 27.4 (pc/m)$ OS = C (Exhibit) Speed Determ $M_S = 0.357 (Exil)$	0.00734 v _R + (i/ln) 13-2) nination vit 13-11) Exhibit 13-11				D _R - (pc LOS = (E) Speed D D _s = (Ex S _R = mn	khibit 13-2) etermina hibit 13-12) n (Exhibit 13-	12)		
V_{R12} $D_R = 5.475 + D_R = 27.4 (pc/m)$ OS = C (Exhibit) Speed Detern $M_S = 0.357 (Exhibit)$ $S_R = 60.0 mph (C)$	0.00734 v _R + (i/ln) 13-2) nination nit 13-11) Exhibit 13-11)				D_R^- (pc LOS = (E) Speed D D_S^- (Ex S_R^- mpl S_{N}^- mpl	khibit 13-2) etermina hibit 13-12) n (Exhibit 13-	n tion .12) .12)		
V_{R12} $D_R = 5.475 +$ $D_R = 27.4 (pc/m)$ OS = C (Exhibit) Speed Determ $M_S = 0.357 (Exil)$ $S_R = 60.0 mph$ ($S_0 = 65.8 $	0.00734 v _R + (i/ln) 13-2) nination Dit 13-11) Exhibit 13-11) Exhibit 13-11)				D_R^- (pc LOS = (E) $S_peed D_0$ D_s^- (Ex S_R^- mpl S_0^- mpl S_0^- mpl	khibit 13-2) etermina hibit 13-12) n (Exhibit 13- n (Exhibit 13-	n tion -12) -12) -12)		

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 6-Be	et Exp On & Off to 10th
Project Description SW 10t	h Street SIMR		Analysis Teal	2020 Bu	
Oper.(LOS)			Des.(N)	Pla	nning Data
Flow Inputs			()		J
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	6920	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain:	0.95 3 0 Level mi	
	nonto	ven/n	Up/Down %		
				10	
'ρ Ε _τ	1.5		$rac{}{}_{R}$ f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985	
Speed Inputs			Calc Speed Adj and FFS	3	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p)2464 51.5 47.9 F	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 8-Be	et Off & Off Ramps
Analysis Time Period	AM		Analysis Year	2020 Bu	ild 1
	n Street Simir				nning Data
			Jes.(N)		
Volume, V AADT	5850	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustr	nents				
f _p Ε _τ	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adi and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p)2083 61.0 34.2 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		RAMP	S AND RAM	IP JUNCTI	ONS WO	RKS	HEET			
General Infor	rmation			Site Infor	mation					
Analyst			Fr	eeway/Dir of Tr	Travel I-95 NB					
Agency or Company	AEC	OM	Ju	Inction		Seg 9-	Off to Hillsb	oro EB&WB		
Date Performed			JL	irisdiction		0000 0	1.1.4			
Project Description	Q AIVI		AI	halysis rear		2020 B	ulia i			
Innuts	300 10(11 3(166									
inputo		Freeway Num	ber of Lanes N	3						
Upstream Adj F	Ramp	Ramn Numbe	ar of Lanes N	1					Downstre	am Adj
Yes	On	Acceleration I	one Longth	I						
				000					Ves 🗹	🗹 On
I No □	Off		Lane Length L	200					🗌 No	Off
	51	Freeway Volu	ime, V _F	5850					. =	2800 ft
Lup –	L	1310					⁻down	2000 11		
V = v	eh/h	Freeway Free	e-Flow Speed, S _{FF}	70.0					V _D =	1460 veh/h
		Ramp Free-F	low Speed, S _{FR}	45.0					5	
Conversion t	o pc/h Un	der Base	Conditions							
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f _{HV}	f _p	v = V/PHI	= x f _{HV} x f _p
Freeway	5850	0.95	Level	3	0	0.	985	1.00	6	250
Ramp	1310	0.92	Level	2	0	0.	990	1.00	1	438
UpStream										
DownStream	1460	0.92	Level	2	0	0.	990	1.00	1	603
F atimatian a	f	Merge Areas			Fatimati		D	viverge Areas		
Estimation of	^{r v} 12				Estimati		^{or v} 12			
	V ₁₂ = V _F	(P _{FM})					V ₁₂ =	V _R + (V _F - V	/ _R)P _{FD}	
L _{EQ} =	(Equa	ation 13-6 or	13-7)		L _{EQ} =		(E	Equation 13-	12 or 13-1	3)
P _{FM} =	using	Equation (Exhibit 13-6)		P _{FD} =		0.5	538 using Ed	quation (Exl	nibit 13-7)
V ₁₂ =	pc/h				V ₁₂ =		40	25 pc/h		
$V_3^{}$ or $V_{av34}^{}$	pc/h (Equation 13	-14 or 13-17)		$\mathrm{V_{3}}$ or $\mathrm{V_{av34}}$		22	25 pc/h (Eq	uation 13-1	4 or 13-17)
Is V_3 or $V_{av34} > 2,70$	00 pc/h? 🗌 Ye	s 🗌 No			Is V_3 or V_{av3}	₃₄ > 2,7	00 pc/h?	Yes 🗹 No	1	
Is V_3 or $V_{av34} > 1.5$	* V ₁₂ /2 🗌 Ye	s 🗌 No			Is V_3 or V_{av3}	₃₄ > 1.5	* V ₁₂ /2	Yes 🗹 No	I	
If Yes,V _{12a} =	pc/h (Equation 13	5-16, 13-18, or		If Yes,V _{12a} = pc/h (Equation 13-16, 13-18, or 13-					
Canacity Che	13-19)			Capacity Checks					
	Actual		anacity	1.0S F2			Actual		anacity	LOS F2
	/ total		Jupuony	20011	V_		6250	Exhibit 13	-8 7200	No
V		Evhibit 13.8			V = V	- V	4910	Exhibit 13	8 7200	No
* FO					VFO VF	⁻ ^v R	4012		-0 7200	NU NI
	<u> </u>				V _R		1438	Exhibit 13-	10 2100	NO
Flow Entering	g Merge In	Ifluence A	Area Desirable	Violation?	Flow En	terin	g Diver	<u>'ge Influer</u>	nce Area	Violation?
V	Actual	IVIAX	Desirable	VIOIALION	V		ACIUAI	Evhibit 13.8		VIOIALION?
	l vice Deterr	nination ((if not E)					torminatic	4400.All	
$D = 5.475 \pm 0$			0.006271		Level OI		1252 ± 0			<i>г)</i>
$D_R = 0.470 + 0.1$.00704 V R '	0.0070 12	- 0.00027 L _A		D - 27	R^{-1}	/mi/lm)	12 ⁻⁰		
$D_R = (pc/m/m)$	1) 42.0)				$\nu_{\rm R} = 37$. i (pc	///////			
	LOS = (Exhibit 13-2)						Dit 13-2)			
Speed Deterr	nination				Speed L		minatio	<u>n</u>		
M _S = (Exibit 1	3-11)				$v_{s} = 0.4$	427 (E		12)		
S _R = mph (Exh	nibit 13-11)				S _R = 58.0 mph (Exhibit 13-12)					
S ₀ = mph (Exh	nibit 13-11)				$S_0 = 72$	2.0 mph	(Exhibit	13-12)		
S = mph (Exh	(13-13) וומור				S = 62	2.3 mph	(Exhibit	13-13)		
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2020 Build 1 Freeway HCS Operational Analysis

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 10-1	Bet Off & On Ramps
Analysis Time Period	AM		Analysis real	2020 Bu	
Oper (LOS)			Des (N)	Pla	nning Data
Flow Inputs	,				
Volume, V AADT Peak-Hr Prop. of AADT, K	4540	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R	0.95 3 0	
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade % Length Up/Down %	Level mi	
Calculate Flow Adjustr	ments				
f _p	1.00		E _R	1.2	
Ε _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1617 68.0 23.8 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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	RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Infor	mation			Site Infor	mation					
Analyst			Fre	eeway/Dir of Tr	avel	I-95 N	IB			
Agency or Company	AEC	ОМ	Ju	nction		Seg 1	1-On Ramp 10	th St EB & W	В	
Date Performed			Ju	risdiction						
Analysis Time Period	AM		An	alysis Year		2020	Build 1			
Project Description		I SINK								
mputs		Freeway Nur	ber of Lanes N	2						
Upstream Adj Ramp		Domp Numbe	or of Lance N	3					Downstrea	m Adj
🗹 Yes 🗌 Or	ı	Acceleration I	on Lane Length L. 1200							
	f	Deceleration	Lane Length L _D							
	I	Freeway Volu	ime, V _F	4540					IMNO NO	Off
L _{up} = 2800	ft	Ramp Volume	e, V _R	1460					L _{down} =	ft
V - 1210 v	(ch/h	Freeway Free	e-Flow Speed, S _{FF}	70.0					V., =	veh/h
v _u - 1310 (/en/m	Ramp Free-F	low Speed, S _{FR}	50.0					- D	
Conversion t	o pc/h Un	der 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	4540	0.95	Level	3	0	().985	1.00	48	51
Ramp	1460	0.92	Level	2	0	().990	1.00	16	603
UpStream	1310	0.92	Level	2	0	().990	1.00	14	38
DownStream										
Estimation of	F 1/	Merge Areas			Ectimat	ion	Dive Of V	erge Areas		
	v ₁₂				Estimat		^{01 v} 12			
	V ₁₂ = V _F	(P _{FM})					V ₁₂ = V _R	+ (V _F - V _R)P _{FD}	
L _{EQ} =	2126.96	6 (Equation	13-6 or 13-7)		L _{EQ} =		(Ed	quation 13-	12 or 13-13	8)
P _{FM} =	0.611	using Equa	tion (Exhibit 13-6)		P _{FD} =		usi	ng Equatio	n (Exhibit 13-	7)
v ₁₂ =	2964	pc/h na/h (Fauati	op 12 14 or 12		V ₁₂ =		pc/	'n		
V ₃ or V _{av34}	1007	pc/n (⊏quau	011 13-14 01 13-		$V_3^{}$ or $V_{av34}^{}$		pc/	h (Equation 1	3-14 or 13-17)
Is V_3 or $V_{av34} > 2,70$	0 pc/h? 🗌 Ye	s 🗹 No			Is V ₃ or V _{av}	₃₄ > 2,	700 pc/h?	res 🗌 No		
Is V_3 or $V_{av34} > 1.5$ '	°V ₁₂ /2	s 🗌 No			Is V ₃ or V _{av}	₃₄ > 1.	5 * V ₁₂ /2	res 🗌 No	40.40.40	10
If Yes,V _{12a} =	2964	pc/h (Equati	on 13-16, 13-		lf Yes,V _{12a} =	=	pc/ 13-1	n (Equation 9)	n 13-16, 13	-18, or
Capacity Che	cks	13-19)			Capacity Checks					
	Actual	(Capacity	LOS F?	<u> </u>	,	Actual	Cap	pacity	LOS F?
					V _F			Exhibit 13-8	3	
VFO	6454	Exhibit 13-8		No	$V_{FO} = V_F$	- V _R		Exhibit 13-8	3	
- +0					V_			Exhibit 13-	-	
								10		
Flow Entering	g Merge In	Ifluence A	Area Desirable	Violation?	Flow En	iterii	ng Diverg	e Influen	ce Area	Violation?
Vera	4567	Exhibit 13-8	4600-All	No	Via		F	xhibit 13-8		VIOIALIOIT
Level of Serv	ice Deterr	nination (if not F)	110	l evel of	f Sei	vice Dete	rminatio	n (if not	F)
$D_{\rm p} = 5.475 +$	$0.00734 v_{-} + 0.00734 v_{-}$	0.0078 V 0.	006271.			D_ =	4.252 + 0.00)86 V., - 0.	0091	/
$D_{\rm p} = 32.8 ({\rm pc/m})$	ii/ln)	12	A		$D_{p} = (r$	к hc/mi/	/ln)	12	D	
IOS = D(Exhibit)	13-2)				R = (F	=xhib	it 13-2)			
Speed Detern	nination				Speed [Dete	rmination			
$M_{\star} = 0.576 (Evi$	hit 13_11)				D, = (E	Exhibit	13-12)			
$S_{=} = 530 \text{ mmb}$	(Evhihit 12 11)				S _p = m	ph (E)	(hibit 13-12)			
$S_R = 65.0 \text{ mph}$	(Exhibit 12-11)				S ₀ = m	ph (E)	(hibit 13-12)			
S = 56.7 mph	(Exhibit 13-13)				S = m	ph (F)	(hibit 13-13)			
					I	r''' (Ľ/				

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To	l-95 NB Seg 12-l	Bet On Ramps
Analysis Time Period	AM		Analysis Year	2020 Bu	ild 1
Project Description SW 10th	n Street SIMR				
Oper.(LOS)			Des.(N)	Pla	anning Data
Flow Inputs					
Volume, V AADT	6000	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustn	nents				
f _p	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	3		t _{LC}		mph
Total Ramp Density, TRD	70.0	ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mpn	FFS	70.0	mph
Base free-flow Speed, BFFS		mpn			
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N > S D = v _p / S LOS	x f _{HV} x f _p) 2137 59.8 35.7 E	pc/h/ln mph pc/mi/ln	<u>Design (N)</u> Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		F	REEWA	Y WEAV	ING WOF	RKSHEE	Т		
Genera	al Informati	on			Site Info	rmation			
Analyst Agency/Co Date Perfo Analysis T	ompany ormed ime Period	AECO AM	М		Freeway/Dir of TravelI-95 NBWeaving Segment LocationSeg 13-Bet On & Off to ExpAnalysis Year2020 Build 1				
Project De	scription SW 10t	h Street SIMF	2		-				
Inputs					1				
Weaving c Weaving n Weaving s Freeway fr	onfiguration umber of lanes, I egment length, L ree-flow speed, F	N s FS		Two-Sided 4 4600ft 70 mph	Segment type Free Freeway minimum speed, S _{MIN} Freeway maximum capacity, C _{IFL}				
Conve	rsions to p	<u>c/h Unde</u>	r Base Co	ondition	s	1			
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)
V _{FF}	4765	0.95	3	0	1.5	1.2	0.985	1.00	5091
V _{RF}	1145	0.92	2	0	1.5	1.2	0.990	1.00	1257
V _{FR}	1235	0.92	2	0	1.5	1.2	0.990	1.00	1356
V _{RR}	125	0.92	2	0	1.5	1.2	0.990	1.00	137
V _{NW}	7704		•					V =	7841
V _w	137							•	
VR	0.017								
Config	uration Cha	aracteris	tics						
Minimum	maneuver lanes,	N _{WL}		0 lc	Minimum we	aving lane c	hanges, LC _{MIN}	I	411 lc/h
Interchang	ge density, ID			0.7 int/mi	Weaving lan	ie changes, L	-C _w		1037 lc/h
Minimum	RF lane changes	, LC _{rf}		0 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		3407 lc/h
Minimum I	FR lane changes	, LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{AL}	L		4444 lc/h
Minimum I	RR lane changes	, LC _{RR}		3 lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		2481
Weavir	ng Segmen	t Speed,	Density,	Level of	Service,	and Cap	pacity		
Weaving s	segment flow rate	, V		7739 veh/h	Weaving inte	ensity factor,	W		0.220
Weaving s	segment capacity	, c _w		9068 veh/h	Weaving see	gment speed	, S		57.7 mph
Weaving s	segment v/c ratio			0.853	Average wea	aving speed,	S _w		60.1 mph
Weaving s	Veaving segment density, D 34.0 pc/m					N Average non-weaving speed, S _{NW}			
Level of S	ervice, LOS			D	Maximum weaving length, L _{MAX} 5889				5889 fi
Notes									
a. Weaving	segments longer t	han the calcula	ated maximum le	ength should I	be treated as is	solated merge	and diverge ar	eas 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".

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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company Date Performed Analysis Time Period	nalyst gency or Company AECOM ate Performed nalysis Time Period AM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 NB Seg 14-I 2020 Bu	95 NB eg 14-North of Hillsboro	
Project Description SW 10t	h Street SIMR					
Oper.(LOS)			Des.(N)	Pla	nning Data	
Flow Inputs						
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5910	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 4 0 Level mi		
Calculate Flow Adjustr	nents					
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.980		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1586 68.3 23.2 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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		F	REEWA	Y WEAV	ING WOF	RKSHEE	ſ		
Genera	I Informati	on			Site Info	rmation			
Analyst Agency/Co Date Perfo Analysis Ti	mpany rmed me Period	AECON PM	И		Freeway/Dir of Travel I-95 NB Weaving Segment Location Seg 1-Bet Copans & Sample Analysis Year 2020 Build 1				
Project Des	scription SW 10t	h Street SIMF	2		-				
Inputs									
Weaving configurationOne-SidedWeaving number of lanes, N4Weaving segment length, Ls2380ftFreeway free-flow speed, FFS70 mph			Segment type Freeway minimum speed, S _{MIN} Freeway maximum capacity, C _{IFL} Terrain type						
Conver	sions to po	c/h Unde	r Base Co	ondition	S				-
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)
V _{FF}	4400	0.95	3	0	1.5	1.2	0.985	1.00	4701
V _{RF}	410	0.92	2	0	1.5	1.2	0.990	1.00	450
V _{FR}	1570	0.92	2	0	1.5	1.2	0.990	1.00	1724
V _{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V _{NW}	4701							V =	6875
V _w	2174								
VR	0.316								
Config	uration Cha	aracterist	tics						
Minimum n	naneuver lanes,	N _{WI}		2 lc	Minimum we	aving lane ch	nanges, LC _{MIN}		2174 lc/h
Interchang	e density, ID			0.7 int/mi	Weaving lan	e changes, L	C _w		2609 lc/h
Minimum F	RF lane changes,	$\mathrm{LC}_{\mathrm{RF}}$		1 lc/pc	Non-weaving	g lane change	es, LC _{NW}		1488 lc/h
Minimum F	R lane changes,	LC_{FR}		1 lc/pc	Total lane ch	nanges, LC _{ALL}			4097 lc/h
Minimum F	R lane changes	, LC _{RR}		lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		783
Weavin	g Segmen	t Speed,	Density,	Level of	Service,	and Cap	acity		
Weaving s	egment flow rate	, V		6784 veh/h	Weaving inte	ensity factor,	W		0.347
Weaving segment capacity, c _w 7478 veh/h				7478 veh/h	Weaving seg	gment speed,	S		48.8 mph
Weaving segment v/c ratio 0.907			Average weaving speed, $S_{\rm W}$				55.8 mph		
Weaving segment density, D 35.2 pc/mi/ln			5.2 pc/mi/ln	Average non-weaving speed, $S_{_{\sf NW}}$			46.1 mph		
Level of Se	ervice, LOS			E	Maximum weaving length, L _{MAX} 5759 ft				
Notes									
a. Weaving	segments longer t	han the calcula	ited maximum le	ength should l	be treated as is	olated merge	and diverge are	eas 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".

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
			-		
General Information			Site Information		
Analyst			Highway/Direction of Travel	1-95 NB	
Agency or Company	AECOM		From/To	Seg 2-Bo	et On & On from
Date Performed Analysis Time Period	PM		Jurisdiction Analysis Year	2020 Bu	ild 1
Project Description SW 10	th Street SIMR				
Oper.(LOS	6)		Des.(N)	Pla	inning Data
Flow Inputs					
Volume, V	4810	veh/h	Peak-Hour Factor, PHF	0.95	
AADT		veh/day	%Trucks and Buses, P _T	3	
Peak-Hr Prop. of AADT, K			%RVs, P _R	0	
Peak-Hr Direction Prop, D			General Terrain:	Level	
DDHV = AADT x K x D		veh/h	Grade % Length	mi	
Calculate Flow Adjust	ments				
f _p	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	3	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	3		f _{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS	6	mph			·
LOS and Performance	e Measures		Design (N)		
Operational (LOS)			Design (N)		
v _p = (V or DDHV) / (PHF x N	l x f _{HV} x f _p) <i>1713</i>	pc/h/ln	V = (V or DDH)(V) / (DHE x N) x	f vf)	no/h/ln
S	66.9	mph		'HV ^ ' p)	pc/n/m
$D = v_p / S$	25.6	pc/mi/ln	5 D - V / S		npn
LOS	С		$D = v_p / S$		pc/mi/in
			Required Number of Lanes, N		
Glossary			Factor Location		
N - Number of lanes	S - Speed		E - Exhibite 11 10 11 12		f _ Evhihit 11 Q
V - Hourly volume	D - Density		$L_R = E_{\text{Minute}} + 110, + 112$	12	$I_{LW} = EXHIDIL + 1 = 0$
v _p - Flow rate	FFS - Free-flow	speed	$\Box_{T} = \Box_{X111011S} + 1 - 10, + 1 - 11, + 11$.19	
LOS - Level of service	BFFS - Base fre	ee-flow speed		0 44 0	IRD - Page 11-11
DDHV - Directional design h	our volume		LUS, S, FFS, v_p - Exhibits 11-	2, 11-3	

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<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,175	0.64	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,139	0.71	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,031	0.49	No

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst			Highway/Direction of Travel	1-95 NB	at On from Comple 8
Agency or Company	AECOM		From/To	Seg 4-Ве Ехр	et On from Sample &
Date Performed Analysis Time Period	PM		Jurisdiction Analysis Year	2020 Bu	ild 1
Project Description SW 10t	th Street SIMR				
✓ Oper.(LOS))		Des.(N)	Pla	nning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K	5780	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R	0.95 3 0	
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade 0.00% Length Up/Down %	Grade 0.00mi 0.00	
Calculate Flow Adjustr	ments				
f _p	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FF	S	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	4		f _{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph			
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1544 68.6 22.5 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	(f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11 f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 -2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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General Infor	mation			Site Inform	nation				
Analyst	mation		Fr	eeway/Dir of Tra		95 NR			
Agonov or Company				notion	vei I-	90 ND log 5 On from I	Evn		
Date Performed	ALO	JIVI		risdiction	0	eg 5-On nonn	_xμ		
Analysis Time Perior	d PM		Ar	nalvsis Year	2	020 Build 1			
Project Description	SW 10th Stree	t SIMR			£	020 Build 1			
Inputs									
Instroom Adi Domp		Freeway Num	ber of Lanes, N	4				Downet	oom Adi
		Ramp Numbe	r of Lanes. N	1				Ramp	eann Auj
🗌 Yes 🛛 🗌 Or	ו	Acceleration I	ane Length L.	1500					
		Deceleration I	ane Length I	1000				IM Yes	L On
I No □ Of	f	Erooway Volu		5790				🗌 No	✓ Off
= ft			ine, v _F	3700				L _{daun} =	6200 ft
-ир п			[,] , v _R	730				down	
√, = veh/h	70.0				V _D =	1300 veh/h			
<u> </u>		Ramp Free-Fl	ow Speed, S _{FR}	50.0					
Conversion t	opc/hUnd	der Base (Conditions	,		1	1		
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/Pł	IF x f _{HV} x f _p
Freeway	5780	0.95	Level	3	0	0.985	1.00		6175
Ramp	730	0.92	Level	2	0	0.990	1.00		801
UpStream								_	
DownStream	1300	0.92	Level	2	0	0.990	1.00		1427
Estimation of	f 1/	Merge Areas			Ectimotic	n of v	Diverge Areas	6	
	v 12					12			
	V ₁₂ = V _F	(P _{FM})				V ₁₂ =	= V _R + (V _F - \	/ _B)P _{ED}	
-EQ =	(Equa	ation 13-6 or	⁻ 13-7)			12	(Equation 1	3-12 or 13	-13)
P _{FM} =	0.118 using Equation (Exhibit 13-6)							tion (Exhibit	13 7)
√ ₁₀ =	727 p	c/h	,		FD T				15-7)
12	2724	oc/h (Fouatio	on 13-14 or 13-		v ₁₂ =		pc/n		
V ₃ or V _{av34}	17)				V ₃ or V _{av34}		pc/h (Equatior	n 13-14 or 13	-17)
Is V ₃ or V _{av34} > 2,70	0 pc/h? 🗹 Ye	s 🗌 No			Is V ₃ or V _{av34}	> 2,700 pc/h?	Yes N	0	
Is V_3 or $V_{av34} > 1.5$	* V ₁₂ /2	s 🗌 No			Is V_3 or V_{av34}	> 1.5 * V ₁₂ /2	Yes N	0	
f Voc V =	2470	oc/h (Equatio	on 13-16, 13-		f Yes,V ₁₂₂ =		pc/h (Equat	ion 13-16,	13-18, or
12a	18, or	13-19)			120		13-19)		
Capacity Che	ecks	<u> </u>			Capacity	Checks			1
	Actual		apacity	LOS F?		Actua		Capacity	LOS F?
					V _F		Exhibit 1	3-8	
V _{FO}	6976	Exhibit 13-8		No	$V_{FO} = V_{F}$ -	V _R	Exhibit 1	3-8	
					Vp		Exhibit 1	13-	
	<u> </u>	<u> </u>		<u> </u>			10		
Flow Entering	g inerge in	TIUENCE A	n rea Docirable	Violation?	Flow Ent	ering Dive		ence Are	a Violation?
Varia	3567	Exhibit 13-8		No	Via	Actual	Exhibit 13-8		violation?
l evel of Serv	vice Detern	nination (if not F)	110		l Service D	eterminati	ion (if no	
$D_{\rm p} = 5.475 +$	0.00734 v _ + ().0078 V 0 ()06271.			$_{\rm p} = 4.252 +$	0.0086 V	0.0091_	,
$R = \frac{251}{100}$	ni/ln)	12	A				12	0.000 LD	
B _R = 23.1 (pc/ii	10.0				- (μυ	//////////////////////////////////////			
	13-2)				LOS = (E)		-		
Speed Deterr	nination				Speed Do	eterminat	ion		
M _S = 0.309 (Exi	bit 13-11)				D _s = (Ex	hibit 13-12)			
S _R = 61.3 mph	(Exhibit 13-11)				S _R = mpl	n (Exhibit 13-12	2)		
		9 – Jan 19	· / E L. 1. 1. 4.0. 4/	2)					
S ₀ = 66.0 mph	(Exhibit 13-11)				5 ₀ – mpr	n (Exhibit 13-1	<u><)</u>		
S ₀ = 66.0 mph S = 63.5 mph	(Exhibit 13-11) (Exhibit 13-13)				S ₀ – mpi S= mpi	n (Exhibit 13-1) n (Exhibit 13-1)	2) 3)		

	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company Date Performed Analysis Time Period	AECOM PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 NB Seg 6-Bet Exp On & Off to 10 2020 Build 1		
Project Description SW 10t	h Street SIMR					
✓ Oper.(LOS)			Des.(N)	Pla	inning Data	
Flow Inputs						
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	6510	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length Up/Down %	0.95 3 0 Level mi		
Calculate Flow Adjustr	nents					
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 2318 55.5 41.8 E	pc/h/ln mph pc/mi/ln	Design (N) Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 8-Be	et Off & Off Ramps
Analysis Time Period	PM h Street SIMP		Analysis Year	2020 BU	lia 1
				Pla	nning Data
Flow Inputs		·	563.(14)		
Volume, V AADT	5210	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustr	nents				
f _p E _T	1.00 1.5		E _R f _{LN/} = 1/[1+P _T (E _T - 1) + P _D (E _D - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adi and FFS	5	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N) S D = v _p / S LOS	x f _{HV} x f _p) 1855 65.0 28.5 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Info	rmation			Site Infor	mation					
Analyst			Fr	eeway/Dir of Ti	avel	I-95 NE	}			
Agency or Compan	y AEC	OM	Ju	Inction		Seg 9-0	Off to Hillst	oro EB&WB		
Date Performed			Ju	irisdiction		0000 0	1.1.4			
Project Description	SW 10th Strop		Ar	halysis rear		2020 B	ulia i			
Innuts										
mputo	_	Freeway Num	her of Lanes N	3						
Upstream Adj	Ramp	Ramo Numbe	ar of Lanes N	1					Downstre	am Adj
Yes	On	Accoloration I	and Longth L	I						
			Lane Length, LA	000					Yes 🗹	l On
✓ No	Off		Lane Length L _D	200					🗆 No	Off
	a	Freeway Volu	ime, V _F	5210					. =	2800 ft
L _{up} –	IL	Ramp Volume	e, V _R	1310					⁻down	2000 11
V =	veh/h	Freeway Free	e-Flow Speed, S _{FF}	70.0					V _D =	1160 veh/h
u		Ramp Free-F	low Speed, S _{FR}	45.0						
Conversion	to pc/h Un	der 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	5210	0.95	Level	3	0	0.	985	1.00	55	566
Ramp	1310	0.92	Level	2	0	0.	990	1.00	14	438
UpStream										
DownStream	1160	0.92	Level	2	0	0.	990	1.00	12	273
Estimation	of v	Merge Areas			Estimat	ion o	L I I I I I I I I I I I I I I I I I I I	liverge Areas		
	⁷⁷ 12				ESumau		1 2			
	V ₁₂ = V _F	(P _{FM})					V ₁₂ =	V _R + (V _F - V	′ _R)P _{FD}	
L _{EQ} =	(Equa	ation 13-6 or	13-7)		L _{EQ} =		(Equation 13-	12 or 13-13	3)
P _{FM} =	using	Equation (Exhibit 13-6)		P _{FD} =		0.	555 using Ec	uation (Exh	ibit 13-7)
V ₁₂ =	pc/h				V ₁₂ =		37	'28 pc/h		
V ₃ or V _{av34}	pc/h ((Equation 13	-14 or 13-17)		$V_3^{}$ or $V_{av34}^{}$		18	38 pc/h (Equ	uation 13-1	4 or 13-17)
Is V_3 or $V_{av34} > 2,7$	'00 pc/h? 🗌 Ye	es 🗌 No			Is V_3 or V_{av}	₃₄ > 2,7	00 pc/h?	Yes 🗹 No		
Is V_3 or $V_{av34} > 1.5$	5*V ₁₂ /2 🗌 Ye	es 🗌 No			Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes V No					
lf Yes,V _{12a} =	pc/h (13-19	(Equation 13	-16, 13-18, or		If Yes,V _{12a} = pc/h (Equation 13-16, 13-18, or 13-					
Capacity Ch	ecks	/			Capacity Checks					
	Actual		Capacity	LOS F?	1		Actual	C	apacity	LOS F?
					V _F		5566	Exhibit 13-	8 7200	No
VEO		Exhibit 13-8			$V_{EQ} = V_{E}$	- V _D	4128	Exhibit 13-	8 7200	No
FU						ĸ	1438	Exhibit 13-	10 2100	No
Elow Entorin	<u>I</u> na Morao Ir) ofluonco /	lroa			torin				
	Actual	Max	Desirable	Violation?			Actual	Max Desira	ible	Violation?
V _{P12}		Exhibit 13-8			V12		3728	Exhibit 13-8	4400:All	No
	vice Deterr	nination (if not F)		Level of	f Serv	/ice De	terminatio	n (if not	F)
$D_{\rm r} = 5.475 \pm 0.00734 \text{v}_{\rm r} \pm 0.0078 \text{V}_{\rm re} = 0.00627 \text{L}_{\odot}$						$D_p = 4$.252 + 0	.0086 V ₄₀ - 0	.009 Lp	- /
$D_{\rm p} = (\rm pc/mi/ln)$				$D_{-} = 34$	- R 15 (nc)	/mi/ln)	12	D		
LOS = (Exhibit 13-2)						(Evhil	nit 13_2)			
Speed Determination					Sneed [minatic	n		
	13-11) hihit 10-14)				$S_{n} = 5$	∟, (∟ ۱۹۳۵ R	(Exhibit	· <i>,</i> 13-12)		
S _R - mpn (Ex	HIDIL 13-11)				$S_{R} = 72$	3.5 mph	(Evhibit	13_12)		
S_0 - mpn (Ex	niDit 13-11) hihit 13-13)) / mak		13 12)		
$\sum_{i=1}^{n} \frac{1}{2} \sum_{i=1}^{n} \frac{1}{2} \sum_{i$	ity of Florida All	Rights Reserved						10-10)	Generated	5/22/2010 2:52

2020 Build 1 Freeway HCS Operational Analysis

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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 10-Bet Off & On Ramps		
Analysis Time Period	PM th Street SIMP		Analysis Year	2020 Bu	iild 1	
Project Description 37770				Pla	anning Data	
Flow Inputs	/		JC3.(IV)			
Volume, V AADT	3900	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3		
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi		
Calculate Flow Adjust	ments					
f _ρ Ε _τ	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1389 69.6 20.0 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design h	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Infor	mation			Site Infor	mation					
Analyst			Fre	eeway/Dir of Tr	avel	I-95 N	IB			
Agency or Company	AEC	ОМ	Ju	nction		Seg 1	1-On Ramp 10	Oth St EB & W	В	
Date Performed			Ju	risdiction						
Analysis Time Period	PM		An	alysis Year		2020	Build 1			
	SW TUth Stree	I SIIVIR								
mputs		Erooway Num	bor of Lange N	2						
Upstream Adj Ramp		Domp Numbo	vr of Lanos N	3					Downstrea Bomn	ım Adj
☑Yes □Or	ı	Acceleration L	ane Length, L.	1200						
	f	Deceleration I	Lane Length L _D						res	
	I	Freeway Volu	me, V _F	3900					NO NO	U Off
L _{up} = 2800	ft	Ramp Volume	e, V _R	1160					L _{down} =	ft
V = 1310 v	/eh/h	Freeway Free	-Flow Speed, S _{FF}	70.0					V _D =	veh/h
		Ramp Free-Fl	low Speed, S _{FR}	50.0					D	
Conversion t	o pc/h Un	der 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	3900	0.95	Level	3	0	(0.985	1.00	4	167
Ramp	1160	0.92	Level	2	0	(0.990	1.00	1:	273
UpStream	1310	0.92	Level	2	0	(0.990	1.00	14	438
DownStream										
Estimation of		Estimat	ion	of V ₄₀	erge Areas					
<u> </u>							12			
l =	*12 *F 1909 96	(Foustion	13-6 or 13-7)				$V_{12} = V_{F}$	_R + (V _F - V _R)P _{FD}	
-EQ P =	0.611		tion (Exhibit 13-6)		L _{EQ} =		(E	quation 13-	12 or 13-1	3)
V ₁₀ =	2546	nc/h			P _{FD} =		us	ing Equation	n (Exhibit 13	-7)
12 Vor V	1621	pc/h (Equati	on 13-14 or 13-		$V_{12} = V_{12}$		pc	/h /h (Faulation 1	2 11 or 12 1	7)
v ₃ 01 v _{av34}	17)				ls V or V	>2	700 pc/b?		5-14 01 15-1	()
Is V_3 or $V_{av34} > 2,70$	0 pc/n? ∐ Ye	s 🗹 No			$ 1 \times V_3 \circ V_{3V34} = 1 \times V_{10} ^2$ Yes No					
$15V_3 01V_{av34} > 1.5$	V ₁₂ /∠ ⊻ Ye	S 🛄 NO na/h (Equati	n 12 16 12		If Yoo V	34 ···	рс	/h (Equatior	n 13-16, 13	8-18, or
If Yes,V _{12a} =	2040 18, or	13-19)	011 13-10, 13-		n res,v _{12a} -		13-	19)		·
Capacity Che	cks				Capacity Checks					
	Actual	C	Capacity	LOS F?			Actual	Сар	acity	LOS F?
					V _F			Exhibit 13-8	3	
V _{FO}	5440	Exhibit 13-8		No	$V_{FO} = V_F$	- V _R		Exhibit 13-8	3	
					V _R			Exhibit 13-	·	
Flow Entering	g Merge In	fluence A	rea		Flow En	teri	ng Diverg	e Influen	ce Area	·
	Actual	Max	Desirable	Violation?			Actual	Max Desi	rable	Violation?
V _{R12}	3819	Exhibit 13-8	4600:All	No	V ₁₂			Exhibit 13-8		
Level of Serv	ice Deterr	nination (if not F)		Level of	^r Sei	rvice Dete	erminatio	n (if not	F)
$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$						D _R =	4.252 + 0.0	086 V ₁₂ - 0.	009 L _D	
$D_{\rm R} = 27.2 (\text{pc/m})$	u/ln)				$D_R = (p)$	oc/mi/	/ln)			
LOS = C (Exhibit 13-2)					LOS = (E		it 13-2)			
Speea Detern	nination				Speed Determination					
M _S = 0.379 (Exi	bit 13-11)				∪ _s = (E S = ~~	nb /⊑	13-12			
S _R = 59.4 mph	(Exhibit 13-11)				S.= ~	pii(⊏) nh (⊏v	which $13 - 12$			
$S_0 = 66.0 \text{ mph}$	(Exhibit 13-11)				o₀− m s− ~	pii(⊏) nh (⊏•	$\frac{1001110-12}{1001110-12}$			
5 – 01.2 mpn	(⊏xhiiuit 13-13)				o- m	hii (F)	(1)(13-13)			

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 12-	Bet On Ramps
Analysis Time Period	PM		Analysis Year	2020 Bu	iild 1
Project Description SW 10th	h Street SIMR				
✓ Oper.(LOS)			Des.(N)	Pla	anning Data
Flow inputs					
Volume, V AADT	5060	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustr	nents				
f _p	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance		ft ft	f _{LW}		mph
Number of Lanes, N Total Ramp Density, TRD	3	ramps/mi	^t ∟c TRD Adjustment		mph mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N) S D = v _p / S LOS	x f _{HV} x f _p) 1802 65.8 27.4 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		F	REEWAY	WEAV	ING WOF	RKSHEE	Г			
General	Informatio	on		Site Information						
Analyst Agency/Con Date Perforr Analysis Tin	npany ned ne Period	AECON PM	1		Freeway/Dir Weaving Seg Analysis Yea	Freeway/Dir of Travel I-95 NB Weaving Segment Location Seg 13-Bet On & Off to Exp Analysis Year 2020 Build 1				
Project Des	cription SW 10th	n Street SIMR			-					
Inputs					1					
Weaving configurationTwo-SidedWeaving number of lanes, N4Weaving segment length, Ls4600ftFreeway free-flow speed, FFS70 mph					Segment typ Freeway min Freeway ma: Terrain type	e imum speed, ximum capac	, S _{MIN} ity, C _{IFL}		Freeway 15 2400 Leve	
Convers	sions to po	/h Under	^r Base Co	ondition	S					
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF}	4095	0.95	3	0	1.5	1.2	0.985	1.00	4375	
V _{RF}	1145	0.92	2	0	1.5	1.2	0.990	1.00	1257	
V _{FR}	965	0.92	2	0	1.5	1.2	0.990	1.00	1059	
V _{RR}	125	0.92	2	0	1.5	1.2	0.990	1.00	137	
V _{NW}	6691							V =	6828	
V _W	137									
VR	0.020									
Configu	ration Cha	racterist	ics		1					
Minimum m	aneuver lanes, N	N _{WL}		0 lc	Minimum weaving lane changes, LC _{MIN}				411 lc/h	
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC_w				1037 lc/h	
Minimum R	F lane changes,	LC _{RF}		0 lc/pc	Non-weaving	3181 lc/h				
Minimum Fl	R lane changes,	LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{ALI}	L		4218 lc/h	
Minimum R	R lane changes,	LC_{RR}		3 lc/pc	Non-weaving vehicle index, I _{NW} 2155					
Weavin	g Segment	Speed, I	Density, I	_evel of	Service,	and Cap	oacity			
Weaving segment flow rate, v6740 velWeaving segment capacity, cw9064 vel					Weaving inte Weaving seg	ensity factor, gment speed	W , S		0.211 58.9 mph	
Weaving segment v/c ratio 0.744					Average weaving speed, ${\rm S}_{\rm W}$				60.4 mph	
Weaving segment density, D 29.0 pc/mi/ln					Average nor	n-weaving spo	eed, S _{NW}		58.8 mph	
Level of Service, LOS D					Maximum weaving length, L _{MAX} 5913 ft					
Notes										
a. Weaving s Chapter 13, " b. For volume	egments longer th Freeway Merge a es that exceed the	an the calcula nd Diverge Se weaving segn	ted maximum le gments". nent capacity, th	ength should l	be treated as is vice is "F".	solated merge	and diverge ar	eas using the	procedures of	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company AECOM Date Performed			Highway/Direction of Travel From/To Jurisdiction Analysis Year	ravel I-95 NB Seg 14-North of Hillsboro		
Project Description SW 10t	th Street SIMR			2020 20		
Oper.(LOS))		Des.(N)	Pla	nning Data	
Flow Inputs					_	
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5240	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 4 0 Level mi		
Calculate Flow Adjustr	ments		Up/Down %			
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.980		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1407 69.5 20.2 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company AECOM Date Performed			Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 SB Seg 1-Bet Hillsboro & Palm	
Project Description SW 10t	th Street SIMR		- ,		-
✓ Oper.(LOS))		Des.(N)	Pla	nning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	4540	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi	
Calculate Flow Adiustr	ments				
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1213 70.0 17.3 B	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		F	REEWA	Y WEAV	ING WOF	RKSHEE	Т		
Genera	al Informati	on		Site Info	Site Information				
Analyst Agency/Company AECOM Date Performed Analysis Time Period AM				Freeway/Dir Weaving Seg Analysis Yea	Freeway/Dir of Travel I95/SB Weaving Segment Location Seg 2-Bet On from Exp & Off Analysis Year 2020 Build 1				
Project De	escription SW 10t	h Street SIMF	8		-				
Inputs					.				
Weaving configurationTwo-SidedWeaving number of lanes, N4Weaving segment length, Ls5200ftFreeway free-flow speed, FFS70 mph				Two-Sided 4 5200ft 70 mph	Segment type Freew Freeway minimum speed, S _{MIN} Freeway maximum capacity, C _{IFL} 24 Terrain type				
Conve	rsions to p	<u>c/h Unde</u>	r Base Co	ondition	s	1			
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)
V _{FF}	3440	0.95	3	0	1.5	1.2	0.985	1.00	3675
V _{RF}	1070	0.92	2	0	1.5	1.2	0.990	1.00	1175
V _{FR}	1100	0.92	2	0	1.5	1.2	0.990	1.00	1208
V _{RR}	120	0.92	2	0	1.5	1.2	0.990	1.00	132
V _{NW}	6058		-	-			-	V =	6190
V _w	132								
VR	0.021								
Config	uration Cha	aracteris	tics						
Minimum	maneuver lanes,	N _{WL}		0 lc	Minimum weaving lane changes, LC _{MIN} 396 lc/h				
Interchan	ge density, ID			0.7 int/mi	Weaving lane changes, LC _w				1064 lc/h
Minimum	RF lane changes	, LC _{rf}		0 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		3040 lc/ł
Minimum	FR lane changes	, LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{AL}	L		4104 lc/h
Minimum	RR lane changes	, LC _{RR}		3 lc/pc	Non-weaving vehicle index, I _{NW} 220				
Weaviı	ng Segmen	t Speed,	Density,	Level of	Service,	and Cap	oacity		
Weaving	segment flow rate	e, V		6111 veh/h	Weaving inte	ensity factor,	W		0.188
Weaving segment capacity, c _w 9241 veh/h					Weaving seg	gment speed	, S		59.8 mph
Weaving segment v/c ratio 0.661					Average wea	aving speed,	S _w		61.3 mph
Weaving segment density, D 25.9 pc/mi/ln			Average non-weaving speed, $S_{_{NW}}$			59.7 mph			
Level of S	Service, LOS			С	Maximum w	eaving length	n, L _{MAX}		5925 f
Notes									
a. Weaving Chapter 13	segments longer t	han the calcula	ated maximum le	ength should l	be treated as is	solated merge	and diverge ar	eas 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".

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	AECOM AM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	l-95 SB Seg 3-B 2020 Bu	et Off & On Ramp illd 1
Project Description SW 10t	th Street SIMR			2020 Du	
Oper.(LOS))		Des.(N)	Pla	anning Data
Flow Inputs					-
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	4510	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi	
Calculate Flow Adjust	monte		Up/Down %		
	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1606 68.1 23.6 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Infor	rmation			Site Infor	mation					
Analyst			Fr	reeway/Dir of Tr	avel I-95 SB					
Agency or Company	AEC	OM	Ju	unction	Seg 4-Diverge to SW 10th St					
Date Performed			Ju	urisdiction		0000 0	114			
Project Description	U AIVI		A	nalysis rear		2020 B	ulia i			
Innuts										
inputo		Freeway Num	ber of Lanes N	3						
Upstream Adj F	Ramp	Ramo Numbe	r of Lanes N	1					Downstre	am Adj
Yes	On	Accoloration I	and Longth L	I						
				000					Yes 🗹	l On
I No □	Off			200					🗆 No	Off
	51	Freeway Volu	me, v _F	4510					. =	1200 ft
Lup −	L	Ramp Volume	e, V _R	1180					⁻down	1200 11
V = v	eh/h	Freeway Free	-Flow Speed, S _{FF}	70.0					V _D =	1370 veh/h
		Ramp Free-F	low Speed, S _{FR}	45.0						
Conversion t	o pc/h Un	der Base	Conditions		1		r		1	
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f _{HV}	f _p	v = V/PHF	x f _{HV} x f _p
Freeway	4510	0.95	Level	3	0	0.	985	1.00	48	319
Ramp	1180	0.92	Level	2	0	0.	990	1.00	1:	295
UpStream										
DownStream	1370	0.92	Level	2	0	0.	990	1.00	1:	504
Estimation of	fv	Merge Areas			Diverge Areas					
	12				LSumau		1 12			
	V ₁₂ = V _F	(P _{FM})					V ₁₂ =	V _R + (V _F - V	′ _R)P _{FD}	
L _{EQ} =	(Equa	ation 13-6 or	13-7)		$L_{EQ} = (Equation 13-12 \text{ or } 13-13)$					
P _{FM} =	using	Equation (Exhibit 13-6)		P _{FD} = 0.580 using Equation (Exhibit 13-7)					
V ₁₂ =	pc/h				V ₁₂ = 3339 pc/h					
V ₃ or V _{av34}	pc/h (Equation 13	-14 or 13-17)		V ₃ or V _{av34} 1480 pc/h (Equation 13-14 or 13-17)					
Is V_3 or $V_{av34} > 2,70$	00 pc/h? 🗌 Ye	s 🗌 No			Is V ₃ or V _{av34} > 2,700 pc/h? □ Yes ☑ No					
Is V_3 or $V_{av34} > 1.5$	*V ₁₂ /2 Ye	s 🗌 No			Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No					
If Yes,V _{12a} =	pc/h (13-19)	Equation 13	-16, 13-18, or		If Yes,V _{12a} = pc/h (Equation 13-16, 13-18, or 13- 19)					
Capacity Che	ecks)			Capacity Checks					
	Actual	(Capacity	LOS F?	Actual Capacity LOS F?					
					V _F		4819	Exhibit 13-	8 7200	No
Vro		Exhibit 13-8			$V_{ro} = V_{r}$	- V _D	3524	Exhibit 13-	8 7200	No
FO							1295	Exhibit 13-	10 2100	No
Elow Entering	<u>a Morao Ir</u>	<u> </u>	roa			torin		rao Influor	$\frac{1}{100}$	
	Actual	Max	Desirable	Violation?			Actual	Max Desira	ble	Violation?
V _{P12}		Exhibit 13-8			V ₁₂		3339	Exhibit 13-8	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_{\rm p} = 5.475 \pm 0.00734 {\rm v}_{\rm p} \pm 0.0078 {\rm V}_{40} = 0.00627 {\rm L}_{\rm h}$						$D_{p} = 4$.252 + 0	.0086 V ₁₂ - 0	.009 L _D	/
$D_{\rm p} = (\rm pc/mi/ln)$					$D_{p} = 31$	1.2 (pc/	/mi/ln)	12	D	
LOS = (Exhibit 13-2)						(Exhil	oit 13-2)			
Speed Deterr	Speed Determination					Deter	minatio	n		
M = (Evibit 1	2 11)				$D_{\rm c} = 0$	415 (F	xhibit 13-	.12)		
S = mah(Ext	$\frac{1}{10}$				s 0. S _D = 58		(Fxhihit	·-, 13-12)		
	$\frac{101113-11}{101112}$				$S_0 = 7/$	1.9 mnh	(Exhibit	13-12)		
S = mnh (Ext	non 13-11) nibit 13-13)				S = 60		(Exhibit	13_13)		
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2020 Build 1 Freeway HCS Operational Analysis

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BASIC FREEWAY WORKSHEET

BASIC FREEWAY SEGMENTS WORKSHEET

General Information			Site Information			
Analyst Agency or Company AECOM Date Performed			Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 5-Bet Off & On Ramps		
Analysis Time Penou	AIVI		Analysis fear	2020 Би		
					unning Data	
Flow Inputs			Jes.(N)		In The Data	
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3300	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length Up/Down %	0.95 3 0 Level mi		
Calculate Flow Adjustr	ments					
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	8		
Lane Width		ft				
Rt-Side Lat. Clearance		ft	f _{LW}		mph	
Number of Lanes, N	3		f _{LC}		mph	
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph	
FFS (measured)	70.0	mph	FFS	70.0	mph	
Base free-flow Speed, BFFS		mph				
LOS and Performance	Measures		Design (N)			
Operational (LOS) v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1175 70.0 16.8 B	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-5	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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RAMPS AND RAMP JUNCTIONS WORKSHEET											
Genera	l Infor	mation			Site Infor	mation					
Analyst Freeway/Dir of						avel	I-95 S	B			
Agency or C	Company	AEC	ОМ	Ju	unction		Seq 6	-Merge from	Hillsboro E&W		
Date Perfor	med			Ju	urisdiction		Ū	0			
Analysis Tin	ne Period	AM		A	nalysis Year		2020	Build 1			
Project Des	cription	SW 10th Stree	t SIMR								
Inputs											
Linstroom A	di Pamp		Freeway Num	ber of Lanes, N	3					Downstree	am Adi
	uj Namp		Ramp Numbe	r of Lanes. N	1					Ramp	
✓ Yes	🗌 On		Acceleration	ane Length	1100						_
					1100					∐ Yes	∐ On
🗌 No	🗹 Off	:	Deceleration L	ane Length L _D						✓ No	Off
			Freeway Volu	me, V _F	3300						<u> </u>
L _{up} =	1200	ft	Ramp Volume	e, V _R	1370					L _{down} =	π
l.			Freeway Free	-Flow Speed, S _{FF}	70.0					V _	
V _u =	1180 v	reh/h	Ramp Free-Fl	ow Speed, S	50.0					v _D =	ven/n
Conver	sion to	o pc/h Un	der Base (Conditions							
(no/	h)	V		Torrain	% Truck	% Dv/	Τ	f	f		vfvf
(pc/	,	(Veh/hr)		Terrain	70TTUCK	/01.00	_	'HV	'p	v — v/i i ii	Λ'HV Λ'p
Freeway		3300	0.95	Level	3	0	(0.985	1.00	3	526
Ramp		1370	0.92	Level	2	0	(0.990	1.00	1:	504
UpStream		1180	0.92	Level	2	0	(0.990	1.00	1:	295
DownStrea	m										
			Merge Areas			—	-		iverge Areas		
Estimat	tion of	v ₁₂				Estimat	ion	of v ₁₂			
		V ₁₂ = V _F	(P _{FM})					V - V		\D	
L _{E0} =		1777.82	2 (Equation	13-6 or 13-7)		_		v 12 ⁻		パ FD	
P =		0 572	using Equat	ion (Exhibit 13-6))	L_{EQ} - (Equation 13-12 of 13-13)					
· FM		0.012	no/h)	P _{FD} = using Equation (Exhibit 13-7)					
v 12 -		2010	pc/n 			V ₁₂ = pc/h					
V_3 or V_{av34}		1510 17)	pc/n (Equation	on 13-14 of 13-		$V_3^{}$ or $V_{av34}^{}$			pc/h (Equation 1	3-14 or 13-1	7)
ls V ₂ or V	> 2 70	$0 \text{ nc/h}^2 \square V_{o}$				Is V ₃ or V _{3V}	_{v34} > 2,700 pc/h? Yes No				
le V or V	/34 · 2,10					$ _{\rm SV_3 \ or \ V_{av24}} > 1.5 * V_{12}/2 $ Yes No					
15 V ₃ OI V _{av}	/34 ~ 1.5	v ₁₂ /∠ ⊻ Ye	S LINO	10 10 10		av	34	r 12'- L	c/h (Fouatio	n 13-16, 13	8-18. or
If Yes,V _{12a} =	=	2016 18 or	pc/h (Equation 13_10)	on 13-16, 13-		If Yes,V _{12a} =	-	13	3-19)		,
Canacit	ty Che	rks	10-10)			Canacit	v Cł	necks			
Capach	y one	Actual		anacity	1 OS E2	Actual Canacity LOS E2					
<u> </u>		Actual	Ť	apacity	LUGT	V		Actual		o	LOGT
						V _F				0	
V _F	0	5030	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V _R		Exhibit 13-	8	
						Vp			Exhibit 13	-	
Elow Er	otoring	Morgo In	fluonoo A	r 00			tori	na Divo			
FIOW EI	nenng	Actual	Max	Desirable	Violation?	FIOW EI		Actual	Max Desi	irable	Violation?
V_		3520	Exhibit 13-8	1600-All	No	V	+-	/ total	Evhibit 13_8		violation.
	2 f Sonu	ico Dotorr	nination (if not E)				nuico Do	torminatio	n (if not	E)
Levero						Leveror	Ser	vice De			<u>r)</u>
$D_{R} = 5.475 + 0.00734 v_{R} + 0.0078 V_{12} - 0.00627 L_{A}$							υ _R =	4.252 + 0	.000 v ₁₂ - 0	.009 L _D	
$\nu_{\rm R}^{=}$ 25.3 (pc/mi/ln) $\nu_{\rm R}^{=}$ (pc/mi/ln)											
LOS = C (Exhibit 13-2) LOS = (Exhibit 13-2)											
Speed L	Detern	nination				Speed L	Dete	rminatic	on		
M _S = 0	.343 (Exit	oit 13-11)				D _s = (E	xhibit	13-12)			
S_= 6	0.4 mnh (/ Fxhibit 13-11)				S _R = m	ph (Ex	(hibit 13-12)			
S = 0	6 / mnh /					S ₀ = m	oh (Fx	(hibit 13-12)			
S_0^{-} S_0^{-}	0.4 IIIPII (2.1 mnh /					s- ~	r (⊏/ nh (⊏-	(hibit 12 12)			
p- 0.	z. i inpri (р- m	hii (E)	(10)(13-13)			

Appendix K

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company AECOM Date Performed			Highway/Direction of Travel From/To Jurisdiction	vel I-95 SB Seg 7-Bet On Ramps	
Analysis Time Period	AM		Analysis Year	2020 Bu	iild 1
Project Description SW 10th	h Street SIMR		-		
✓ Oper.(LOS)			Des.(N)	Pla	anning Data
Volume, V AADT	4700	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%Rvs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustn	nents				
f _p	1.00		E _R	1.2	
É _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	3	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	3	, .			mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph			
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p) 1674 67.4 24.8 C	pc/h/ln mph pc/mi/ln	<u>Design (N)</u> Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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Job: SW 10th Street SIMR Analyst: AECOM

Location:	Seg 8: I-	eg 8: I-95 Southbound On-Ramp from SW 10th Stree								
Analysis Period:	AM Peak	Hour								
Analysis Year:	2020 Bui	ld 1								
4.700			5.920							
,										
1 000										
1,220										
	PHF =	0.95								
	v _{fr} =	5,920	vph							
	v _r =	1,220	vph							
	v _f =	4,700								
Upstream Freeway	Tr % =	3%								
Ramp	Tr % =	2%								
Downstream Freeway	' Tr % =	3%								
Freeway	f _{HV} =	1/(1+P	т(Е _т -1)+Р _к (Е _к -	1)) =	0.985					
Ramp	f _{HV} =	1/(1+P	_T (E _T -1)+P _R (E _R -	1)) =	0.9901					
flat terrain	Ε _τ =	1.5								
	RV % =	0								
Driver Population adj.	f _P =	1.000								
	V _{fr} =	=v _{fr} /(PF	HF)(f _{H∨})(f _P) =	6,325	pc/h					
	V _r =	=v _r /(PH	IF)(f_{HV})(f_{P}) =	1,297	pc/h					
	V _f =	=v _f /(PH	$ F\rangle(f_{HV})(f_{P}) =$	5,022	pc/h					
No. lanes upstream of ramp	N =	3	,,,,,,,,,,,,							

<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,325	0.66	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,022	0.70	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,297	0.62	No

	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company <i>AECOM</i> Date Performed Analysis Time Period <i>AM</i>			Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 SB Seg 9-Bet 10th & Exit to Exp		
Project Description SW 10t	th Street SIMR			2020 Du		
✓ Oper.(LOS))		Des.(N)	Pla	nning Data	
Flow Inputs						
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5920	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi		
Coloulate Flow Adjust			Up/Down %			
	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1581 68.3 23.1 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Infor	rmation			Site Infor	mation					
Analyst			Fre	eeway/Dir of Tr	avel	I-95 SE	}			
Agency or Company	AEC	OM	Ju	nction		Seg 10	- Diverge to	o Express		
Date Performed			Ju	risdiction						
Analysis Time Perio	d AM		An	alysis Year		2020 B	uild 1			
Project Description	SW 10th Stree	IT SIMR								
mputs									1	
Upstream Adj F	Ramp	Freeway Nurr	IDER OF Lanes, IN	4					Downstrea	m Adj
		Ramp Numbe	er of Lanes, N	1					Ramp	
res 🗈	≤ On	Acceleration I	_ane Length, L _A						🗌 Yes	On
No 🗌	Off	Deceleration	Lane Length L _D	300						□ ∩ff
		Freeway Volu	5920							
L _{up} = 45	500 ft	Ramp Volume	e, V _R	860					L _{down} =	ft
		Freeway Free	-Flow Speed, S	70.0						. . / .
$V_u = 12$	220 veh/h	Ramp Free-F	low Speed, S _{FR}	45.0					v _D -	ven/n
Conversion t	to pc/h Un	der Base	Conditions						n	
(nc/h)	V	PHF	Terrain	%Truck	%Rv		f	f	v = V/PHF	x fx f
	(Veh/hr)	0.05			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		HV	- p		HV P
Freeway	5920	0.95	Level	3	0	0.	985	1.00	632	25
Ramp	860	0.92	Level	2	0	0.	990	1.00	94	4
DownStream	1220	0.92	Level	2	0	0.	990	1.00	133	9
DownStream	I	Merge Areas					I) iverge Areas		
Estimation of	f v ₁₂				Estimati	ion o	f v ₁₂	j		
		(P)					<u> 12</u>	V + (V - V)		
_	*12 *F	\'FM/	12 7)		. –		• 12 ⁻	R' (F'	「R/ FD 12 or 12 12)	
	(Lyud		13-7		EQ -		()	_qualion 15-	12 01 13-13)	:1 10 7)
FM -	using	Equation (Exhibit 13-0)		FD -		0.4	450 using ⊏u		1113-7)
$v_{12} - v_{12} - v$	pc/n	F	44 40 47		$v_{12} - v_{12} - v$		32	90 pc/n		
v_3 or v_{av34}	pc/n (Equation 13	-14 or 13-17)		v ₃ or v _{av34}		15 00/h 0	o1/ pc/h (Equ	uation 13-14	or 13-17)
IS V_3 or $V_{av34} > 2,70$	00 pc/n? [] Ye	s 🗌 No			IS V_3 or V_{av3}	₃₄ > 2,7	00 pc/n?	∐Yes ⊻No		
Is V_3 or $V_{av34} > 1.5$	^ V ₁₂ /2 ∐Ye	s ∐No Favation 12	10 10 10		Is v_3 or $v_{av34} > 1.5$ $v_{12}/2$ Yes V No					10 10
If Yes,V _{12a} =	pc/n (13-19)	Equation 13	-16, 13-18, 01		If Yes, V_{12a} = pc/n (Equation 13-16, 13-18, or 13- 19)					
Capacity Che	ecks	,			Capacity Checks					
	Actual		Capacity	LOS F?			Actual	C	apacity	LOS F?
					V _F		6325	Exhibit 13	-8 9600	No
VEO		Exhibit 13-8			$V_{EO} = V_{E}$	- V _D	5381	Exhibit 13	-8 9600	No
FO							944	Exhibit 13-	10 2100	No
Elow Entorin	a Morgo In	fluonco /	Iroa			torin				
FIOW Entering	Actual	Max	Desirable	Violation?			Actual	Max Desira	ice Alea	Violation?
Vara	/ totaan	Exhibit 13-8		violation.	Via		3290	Exhibit 13-8	4400·All	No
l evel of Serv	ice Detern	nination (if not F)		l evel of	Ser	vice De	terminatio	n (if not F	=)
$D_{\rm p} = 5.475 \pm 0.00734 \text{v}_{-} \pm 0.0078 \text{V}_{-} = 0.00627 \text{L}_{-}$					$D_{-} = 4.252 \pm 0.0086 \text{ V} = 0.0091$					
$D_{-} = (nc/mi/ln)$						$D_{\rm R} = \frac{1}{2} $				
$P_{R} = (Pointin)$							ait 12 2)			
Speed Dator	Spood D		minatio	<u>n</u>						
Speed Deteri							vhihit 12	12)		
w _s = (Exibit 1	3-11) 111 (0 (1)				S = FO	000 (E		12 12)		
S _R = mph (Exh	nibit 13-11)				S	.s mpn		10-12) 10-10)		
S ₀ = mph (Exh	nibit 13-11)				S ₀ - 75	.4 mph	(EXNIDIT	13-12)		
S = mph (Ext)	nidit 13-13)				5 = 65	.3 mph	(Exhibit	13-13)		
yright © 2016 Universit	ty of Florida, All R	Rights Reserved			HCS2010 [™]	¹ Versi	on 6.90		Generated: 5	/25/2019 9:41

2020 Build 1 Freeway HCS Operational Analysis

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company AECOM Date Performed Analysis Time Period AM			Highway/Direction of Travel From/To Jurisdiction Analysis Year		Bet Off Exp Off Sample
Project Description SW 10t	th Street SIMR				
✓ Oper.(LOS))		Des.(N)	Pla	anning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5060	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length Up/Down %	0.95 3 0 Level mi	
Calculate Flow Adjusti	ments				
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1352 69.7 19.4 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	Analyst Agency or Company AECOM Date Performed Analysis Time Period AM		Highway/Direction of Travel I-95 Seg From/To Seg Jurisdiction		Bet Off & On Ramps ild 1
Project Description SW 10t	th Street SIMR				
Oper.(LOS))		Des.(N)	Pla	nning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	4180	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi	
Calculate Flow Adjust	ments				
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1489 69.0 21.6 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		F	REEWAY	WEAV	ING WOR	RKSHEE	Г			
General	Informatio	on			Site Information					
Analyst Agency/Con Date Perforr Analysis Tin	Analyst Agency/Company AECOM Date Performed Analysis Time Period AM				Freeway/Dir of Travel I-95 SB Weaving Segment Location Seg 14- Bet Sample & Copans Analysis Year 2020 Build 1					
Project Desc	cription SW 10th	n Street SIMR								
Inputs										
Weaving con Weaving nu Weaving sea Freeway free	nfiguration mber of lanes, N gment length, L _s e-flow speed, FF	Segment typ Freeway min Freeway may Terrain type	Freeway 15 2400 Leve							
Convers	sions to po	/h Undei	r Base Co	ondition	S		1			
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF}	3575	0.95	3	0	1.5	1.2	0.985	1.00	3820	
V _{RF}	1790	0.92	2	0	1.5	1.2	0.990	1.00	1965	
V _{FR}	605	0.92	2	0	1.5	1.2	0.990	1.00	664	
V _{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0	
V _{NW}	3820							V =	6449	
V _W	2629									
VR	0.408									
Configu	ration Cha	racterist	ics		•					
Minimum m	aneuver lanes, N	N _{WL}		2 lc	Minimum weaving lane changes, LC _{MIN}				lc/h	
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC_w				lc/h	
Minimum R	F lane changes,	LC _{RF}		1 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		lc/h	
Minimum Ff	R lane changes,	LC _{FR}		1 lc/pc	Total lane ch	nanges, LC _{ALI}	L		lc/h	
Minimum R	R lane changes,	LC _{RR}		lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		792	
Weavin	g Segment	Speed,	Density, I	_evel of	Service,	and Cap	oacity			
Weaving segment flow rate, v6367 veh/hWeaving segment capacity, c5800 veh/h			6367 veh/h 5800 veh/h	Weaving inte Weaving seg	ensity factor, gment speed	W ,S		mph		
Weaving segment v/c ratio 1.098					Average wea	aving speed,	S _W		mph	
Weaving segment density, D pc/mi/ln				pc/mi/ln	Average non-weaving speed, $\mathbf{S}_{_{NW}}$				mph	
Level of Service, LOS F					Maximum weaving length, L _{MAX} 6767 ft					
Notes a. Weaving s Chapter 13, " b. For volume	egments longer th Freeway Merge a es that exceed the	an the calcula nd Diverge Se weaving segn	ted maximum le gments". nent capacity, th	ength should l	be treated as is vice is "F".	solated merge	and diverge an	eas using the	procedures of	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company AECOM Date Performed			Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 1-Bet Hillsboro & Palmett		
Analysis Time Period	PM		Analysis Year	2020 Bu	ild 1	
Project Description SW 10th	h Street SIMR		2 40			
✓ Oper.(LOS)			Jes.(N)		inning Data	
	(000			0.05		
Volume, V AADT	4990	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3		
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi		
Calculate Flow Adjustr	nents					
f _p	1.00		E _R	1.2		
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985		
Speed Inputs			Calc Speed Adj and FFS	\$		
Lane Width		ft				
Rt-Side Lat. Clearance		ft	f _{LW}		mph	
Number of Lanes, N	4		T _{LC}		mpn	
EES (moasured)	70.0	ramps/mi		70.0	mpn	
Base free-flow Speed BEES	70.0	mph	FFS	70.0	mpn	
		прп				
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N : S D = v _p / S LOS	x f _{HV} x f _p) 1333 69.8 19.1 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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		F	REEWA	Y WEAV	ING WOF	RKSHEE	Т		
Genera	al Informati	on			Site Info	rmation			
Analyst Agency/Co Date Perfo Analysis T	Analyst Agency/Company AECOM Date Performed Analysis Time Period PM				Freeway/Dir of Travel I95/SB Weaving Segment Location Seg 2-Bet On from Exp & Off Analysis Year 2020 Build 1				
Project De	escription SW 10t	h Street SIMF	8		-				
Inputs					1				
Weaving configurationTwo-SidedWeaving number of lanes, N4Weaving segment length, Ls5200ftFreeway free-flow speed, FFS70 mph				Segment type Fre Freeway minimum speed, S _{MIN} Freeway maximum capacity, C _{IFL} Terrain type					
Conve	rsions to p	<u>c/h Unde</u>	r Base Co	ondition	S				
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)
V _{FF}	4055	0.95	3	0	1.5	1.2	0.985	1.00	4332
V _{RF}	1105	0.92	2	0	1.5	1.2	0.990	1.00	1213
V _{FR}	935	0.92	2	0	1.5	1.2	0.990	1.00	1026
V _{RR}	125	0.92	2	0	1.5	1.2	0.990	1.00	137
V _{NW}	6571		-	-			-	V =	6708
V _w	137							-	
VR	0.020								
Config	uration Cha	aracteris	tics						
Minimum	maneuver lanes,	N _{WL}		0 lc	Minimum weaving lane changes, LC _{MIN} 41 ⁻				411 lc/h
Interchang	ge density, ID			0.7 int/mi	Weaving lan	e changes, L	.C _w		1079 lc/h
Minimum	RF lane changes	, LC _{rf}		0 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		3154 lc/h
Minimum	FR lane changes	, LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{AL}	L		4233 lc/h
Minimum	RR lane changes	, LC _{RR}		3 lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		2392
Weavir	ng Segmen	t Speed,	Density,	Level of	Service,	and Cap	oacity		
Weaving s	segment flow rate	, V		6622 veh/h	Weaving inte	ensity factor,	W		0.192
Weaving segment capacity, c _w 9241 veh/h				9241 veh/h	Weaving seg	gment speed	, S		59.0 mph
Weaving s	segment v/c ratio			0.717	Average weaving speed, S_w				61.1 mph
Weaving s	segment density,	D	2	8.4 pc/mi/ln	Average non-weaving speed, $S_{_{\sf NW}}$				59.0 mph
Level of S	Service, LOS			D	Maximum weaving length, L _{MAX} 5916 f				
Notes									
a. Weaving	segments longer t	han the calcula	ated maximum le	ength should l	be treated as is	solated merge	and diverge ar	eas 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".

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company AECOM Date Performed Analysis Time Period PM			Highway/Direction of Travel From/To Jurisdiction Analysis Year	l-95 SB Seg 3-B 2020 Bu	et Off & On Ramp ild 1
Project Description SW 10t	th Street SIMR			2020 24	
Oper.(LOS))		Des.(N)	Pla	anning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5160	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi	
Calculate Flow Adjust	monts		Up/Down %		
	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1838 65.3 28.2 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		RAMP	S AND RAM	P JUNCTI	ONS WO	RKS	HEET			
General Infor	mation			Site Infor	mation					
Analyst			Fr	eeway/Dir of Tr	avel	I-95 SE	3			
Agency or Company	AEC	OM	Ju	inction		Seg 4-	Diverge to S	W 10th St		
Date Performed			Ju	risdiction						
Analysis Time Period	PM		Ar	nalysis Year		2020 B	uild 1			
Project Description	SW 10th Stree	et SIMR								
inputs										
Upstream Adj R	amp	Freeway Num	iber of Lanes, N	3					Downstre	eam Adj
		Ramp Numbe	r of Lanes, N	1					Ramp	
L Yes L	」On	Acceleration I	ane Length, L _A						🗹 Yes	On
✓ No	Off	Deceleration	_ane Length L _D	200						□ <u>0</u> "
		Freeway Volu	me, V _F	5160						UΠ
L _{up} = ff	t	Ramp Volume	e. V _D	1250					L _{down} =	1200 ft
- F		Freeway Free	-Flow Speed S	70.0						
V _u = ve	eh/h	Domp Fron E	low Speed S	10.0					V _D =	1500 veh/h
0				43.0						
conversion to	opc/nUn	der Base	Conditions	r	1	-r			r	
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f _{HV}	f _p	v = V/PH	F x f _{HV} x f _p
Freeway	5160	0.95	l evel	3	0	0	985	1.00	F	513
Ramp	1250	0.00		2	0		990	1.00		372
UpStream	1200	0.02	LOVEI		, v		000	1.00	· · · · ·	012
DownStream	1500	0.92	Level	2	0	0.	990	1.00	1	647
		Merge Areas					Di	verge Areas		•
Estimation of	· V12				Estimat	tion o	f V12			
	12	(P)					12			
_	v 12 - v F	(^F FM)	40 T)				v ₁₂ –	v _R + (v _F - v		0)
_{EQ} = (Equation 13-6 or 13-7)					L _{EQ} =		(E	quation 13-	12 or 13-1	3)
FM =	using	Equation (=xhibit 13-6)		P _{FD} =		0.5	59 using Eq	uation (Ex	hibit 13-7)
/ ₁₂ =	pc/h				V ₁₂ =		368	87 pc/h		
V_3 or V_{av34}	pc/h (Equation 13	-14 or 13-17)		$V_3^{}$ or $V_{av34}^{}$		182	26 pc/h (Equ	ation 13-1	14 or 13-17)
Is V_3 or $V_{av34} > 2,70$	0 pc/h? 🗌 Ye	s 🗌 No			Is V_3 or V_{av}	_{/34} > 2,7	00 pc/h?	Yes 🗹 No		
Is V ₃ or V _{av34} > 1.5 *	[•] V ₁₂ /2 □ Ye	s 🗌 No			Is V ₃ or V _{av}	, ₃₄ > 1.5	* V ₁₂ /2	Yes 🗹 No		
fYesV=	pc/h (Equation 13	-16, 13-18, or		If Yes V	=	рс	h (Equatior	n 13-16, 13	3-18, or 13-
12a	13-19)			11 1 00, V 12a		19)		
Capacity Che	cks				Capacit	y Ch	ecks	-		
	Actual		apacity	LOS F?			Actual	Cá	apacity	LOS F?
					V _F		5513	Exhibit 13-	8 7200	No
V _{FO}		Exhibit 13-8			$V_{FO} = V_{F}$	- V _R	4141	Exhibit 13-	8 7200	No
					V _R		1372	Exhibit 13-1	10 2100	No
- Iow Entering	n Merae Ir	fluence 4	rea			nterin	a Diver	re Influer	ice Area)
	Actual	Max	Desirable	Violation?			Actual	Max Desira	ble	Violation?
Vpra		Exhibit 13-8			V ₄₀		3687	Exhibit 13-8	4400·All	No
avel of Serv	ico Dotorr	nination (if not E)			fSor	vice Det	orminatio	n (if not	• F)
			0.006271		Leveror)
$D = 5.475 \pm 0.0$		0.0076 v ₁₂	0.00027 L _A		_	0 _R - 4	1.252 + 0.0	1000 v ₁₂ - 0	.009 L _D	
D _R = 5.475 + 0.	ν, γ,				$ _{2} = 32$	4.2 (pc	/mi/ln)			
$D_R = 5.475 + 0.$ $D_R = (pc/mi/ln)$)				-R 0-	= (I				
$D_{R} = 5.475 + 0.$ $D_{R} = (pc/mi/ln)$ $OS = (Exhibit)^{2}$) 13-2)				LOS = D	(Exhi	oit 13-2)			
$D_R = 5.475 + 0.$ $D_R = (pc/mi/ln + 0.05 = (Exhibit - 0.05)$) 13-2) nination				LOS = D	(Exhil Deter	oit 13-2) <i>minatio</i>	n		
$D_{R} = 5.475 + 0.$ $D_{R} = (pc/mi/ln)$ $OS = (Exhibit)^{-1}$ Speed Determ $M_{0} = (Exibit)^{-1}$) 13-2) nination				LOS = D Speed L D _s = 0.	(Exhil Deter .421 (E	oit 13-2) minatio xhibit 13-1	n (2)		
$D_{R} = 5.475 + 0.$ $D_{R} = (pc/mi/ln)$ $OS = (Exhibit)^{2}$ $Speed Detern$ $M_{S} = (Exibit) = 0.$) 13-2) nination 3-11) ibit 13-11)				LOS = D Speed L $D_s = 0.$ $S_D = 58$	(Exhil Deter .421 (E 8.2 mph	oit 13-2) mination xhibit 13-1 (Exhibit 1	n 2) 3-12)		
$D_{R} = 5.475 + 0.$ $D_{R} = (pc/mi/ln + 0.05) = (Exhibit)^{-1}$ $COS = (Exhibit)^{-1}$ $Speed Detern$ $M_{S} = (Exibit)^{-1}$ $S_{R} = mph (Exh)$ $S_{R} = mph (Exh)$) 13-2) nination 3-11) ibit 13-11)				LOS = D Speed L $D_s = 0.$ $S_R = 58$ $S_2 = 72$	(Exhil Deter .421 (E 8.2 mph 3.6 mph	bit 13-2) mination xhibit 13-1 (Exhibit 1	n 2) 3-12) 3-12)		
$D_{R} = 5.475 + 0.$ $D_{R} = (pc/mi/ln)$ $OS = (Exhibit)$ $M_{S} = (Exibit)$ $M_{S} = (Exibit)$ $M_{S} = (Exibit)$ $M_{S} = mph (Exh)$ $M_{S} = mph (Exh)$ $M_{S} = mph (Exh)$) 13-2) nination 3-11) ibit 13-11) ibit 13-11) ibit 13-12)				$D_{s} = 0$ $D_{s} = 0$ $S_{R} = 58$ $S_{0} = 73$ $S_{-} = 73$	(Exhil Deter .421 (E 8.2 mph 3.6 mph	nit 13-2) mination xhibit 13-1 (Exhibit 1 (Exhibit 1	n 2) 3-12) 3-12) 2 12)		

2020 Build 1 Freeway HCS Operational Analysis

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	Analyst Agency or Company AECOM Date Performed Analysis Time Period PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	l-95 SB Seg 5-B 2020 Bu	et Off & On Ramps illd 1
Project Description SW 10t	th Street SIMR			2020 Du	
Oper.(LOS))		Des.(N)	Pla	anning Data
Flow Inputs					-
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3910	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi	
Calculate Flow Adjust	monte		Up/Down %		
	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1393 69.6 20.0 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		RA	MPS AND	RAMP JUN	CTIONS W	/ORKSH	EET				
Genera	l Infor	mation			Site Infor	mation					
Analyst Agency or Date Perfo	Company rmed	AEC	МС	Fi Ju Ju	reeway/Dir of Tra unction urisdiction	avel	I-95 S Seg 6	B -Merge from	n Hillsboro E&W		
Analysis Ti	me Period	PM		A	nalysis Year		2020	Build 1			
Project Des	scription	SW 10th Stree	t SIMR								
Inputs											
Upstream /	Adj Ramp		Freeway Num Ramp Numbe	ber of Lanes, N	3 1					Downstrea Ramp	ım Adj
🗹 Yes	On		Acceleration L	ane Length, L _A	1100					Yes	🗌 On
🗌 No	✓ Off		Deceleration I Freeway Volu	.ane Length L _D me. V_	3910					🗹 No	Off
L _{up} =	1200	ft	Ramp Volume	e, V _R	1500					L _{down} =	ft
V _u =	1250 v	reh/h	Freeway Free Ramp Free-Fl	-Flow Speed, S _{FF} ow Speed, S _{FP}	70.0 50.0					V _D =	veh/h
Conver	rsion to	o pc/h Un	der Base (Conditions							
(pc	:/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f _{HV}	fp	v = V/PHF	x f _{HV} x f _p
Freeway		3910	0.95	l evel	3	0).985	1.00	4'	178
Ramp		1500	0.92	Level	2	0		0.990	1.00	16	647
UpStream		1250	0.92	Level	2	0).990	1.00	1:	372
DownStrea	am										
			Merge Areas		8			Ľ)iverge Areas		
Estima	tion of	v ₁₂				Estimation of v ₁₂					
		V ₁₂ = V _F	(P _{FM})					$V_{in} = V_{in}$	V_ + (V V_)P	
L _{FO} =		1947.95	(Equation	13-6 or 13-7)				• 12	^v R · (^v F ^v R /Equation 13	/'FD 12 or 13 13	2)
Р _{ЕМ} =		0.561	using Equat	ion (Exhibit 13-6)	EQ D –			Lyualion 13-	·12 01 13-10	7)
$V_{12} =$		2344	oc/h	(/	FD -		ι	using Equatio	n (Exnibit 13	-7)
		1834	oc/h (Equati	on 13-14 or 13-		V ₁₂ =		F	oc/h		
V ₃ or V _{av34} Is V ₂ or V		17) 0 pc/h? 🗆 Ve				V_3 or V_{av34} Is V_3 or V_{av}	, ₃₄ > 2,	 700 pc/h?	pc/h (Equation 1 □Yes □ No	3-14 or 13-17	7)
Is V. or V	$1034 \times 2,70$					Is V ₃ or V ₃	, ₃₄ > 1.	5 * V ₁₂ /2	Yes No		
If Yes,V _{12a}	=	2387	pc/h (Equation	on 13-16, 13-		If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					3-18, or
Canaci	ty Che	10, 01	13-19)			Canacit	ty Ch	necks			
	ly One	Actual		anacity	LOS F2	Actual Capacity LOS F?					
		710100	Ĭ	apaony	20011	V _E		71010101	Exhibit 13-	8	20011
V _F	-0	5825	Exhibit 13-8		No	V _{FO} = V _F	- V _R		Exhibit 13-	8	
						V _R			Exhibit 13 10	-	
Flow E	ntering	n Merge In	fluence A	rea	1.	Flow Er	nterii	ng Dive	rge Influen	ice Area	
		Actual	Max	Desirable	Violation?			Actual	Max Des	irable	Violation?
V _R	12	4034	Exhibit 13-8	4600:All	No	V ₁₂			Exhibit 13-8		
Level o	of Serv	ice Detern	nination (if not F)		Level of	f Ser	rvice De	terminatio	n (if not	F)
D _R	= 5.475 +	0.00734 v _R + (0.0078 V ₁₂ - 0.0	00627 L _A			D _R =	4.252 + 0	.0086 V ₁₂ - 0	.009 L _D	
D _R = 2	29.3 (pc/m	i/ln)				D _R = (p	pc/mi/	/ln)			
LOS = [D (Exhibit	13-2)				LOS = (I	Exhibi	it 13-2)			
Speed	Detern	nination				Speed I	Dete	rminatic	on		
M _S = (0.431 (Exit	oit 13-11)				D _s = (Exhibit 13-12)					
S _R = 5	57.9 mph (Exhibit 13-11)				S _R = m	ıph (Ex	(hibit 13-12)			
S ₀ = 6	65.4 mph (Exhibit 13-11)				S ₀ = m	nph (Ex	(hibit 13-12)			
S = 6	60.0 mph (Exhibit 13-13)				S = m	nph (Ex	(hibit 13-13)			

Appendix K

BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed Analysis Time Period	AECOM PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 SB Seg 7-B 2020 Bu	et On Ramps iild 1				
Project Description SW 10th	h Street SIMR			2020 Bu					
✓ Oper.(LOS)			Des.(N)	🗌 Pla	anning Data				
Flow Inputs					-				
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5410	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi					
		-	Up/Down %						
Calculate Flow Adjustr	nents		_						
f _p	1.00		E _R	1.2					
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985					
Speed Inputs			Calc Speed Adj and FFS	8					
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph				
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p) 1927 63.9 30.2 D	pc/h/ln mph pc/mi/ln	<u>Design (N)</u> Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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Job: SW 10th Street SIMR Analyst: AECOM

Location: Seg 8: I-95 Southbound On-Ramp from SW 10th Street EB 8 Analysis Period: PM Peak Hour									
Analysis Year:	2020 Bui	ld 1							
5,410			▶ 6,630						
						\rightarrow			
1,220									
	PHF =	0.95							
	v _{fr} =	6,630	vph						
	v _r =	1,220	vph						
	v _f =	5,410							
Upstream Freeway	Tr % =	3%							
Ramp	Tr % =	2%							
Downstream Freeway	Tr % =	3%							
Freeway	f _{HV} =	1/(1+P	т(Ет-1)+Р _к (Е _к -	·1)) =	0.985				
Ramp	f _{HV} =	1/(1+P	т(Е _т -1)+Р _R (Е _R -	·1)) =	0.9901				
flat terrain	Ε _τ =	1.5							
	RV % =	0							
Driver Population adj.	f _P =	1.000							
	V _{fr} =	=v _{fr} /(PH	$HF)(f_{HV})(f_{P}) =$	7,084	pc/h				
	V _r =	=v _r /(PH	$IF(f_{HV})(f_{P}) =$	1,297	pc/h				
	V _f =	=v _f /(PH	IF)(f _{HV})(f _P) =	5,780	pc/h				
No. lanes upstream of ramp	N =	3			-				

<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	7,084	0.74	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,780	0.80	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,297	0.62	No

BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed Analysis Time Period	AECOM		Highway/Direction of Travel From/To Jurisdiction	l-95 SB Seg 9-Be 2020 Bu	et 10th & Exit to Exp				
Project Description SW 10t	h Street SIMR			2020 Du					
✓ Oper.(LOS))		Des.(N)	Pla	Inning Data				
Flow Inputs			· · /						
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	6630	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi					
		Volum	Up/Down %						
Calculate Flow Adjustr	nents								
f _p	1.00		E _R	1.2					
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985					
Speed Inputs			Calc Speed Adj and FFS	6					
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph				
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1771 66.2 26.7 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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		RAMP	S AND RAM	P JUNCTI	ONS WO	RKS	HEET					
General Infor	rmation			Site Infor	mation							
Analyst			Fre	eeway/Dir of Tr	avel	I-95 SE	}					
Agency or Company	AEC	OM	Ju	nction		Seg 10	- Diverge to	o Express				
Date Performed			Ju	risdiction								
Analysis Time Perio	d PM		An	alysis Year		2020 B	uild 1					
Project Description	SW 10th Stree	IT SIMR										
inputs									1			
Upstream Adj F	Ramp	Freeway Nurr	IDER OF Lanes, IN	4					Downstrea	m Adj		
		Ramp Numbe	er of Lanes, N	1					Ramp			
res 🗈		Acceleration I	_ane Length, L _A						🗌 Yes	On		
No 🗌	300											
		Freeway Volu	ime, V _F	6630								
L _{up} = 45	500 ft	Ramp Volume	e, V _R	720					L _{down} =	ft		
		Freeway Free	-Flow Speed, S	70.0						. /.		
$V_u = 12$	220 veh/h	Ramp Free-F	low Speed, S _{ED}	45.0					V _D =	ven/n		
Conversion t	o pc/h Un	der Base	Conditions									
(no/h)	V		Torroin	0/ Truck	0/ D)/		f	f		vf vf		
(pc/n)	(Veh/hr)	PHF	remain	% ITUCK	%KV		'HV	ľр		^ ' HV ^ ' p		
Freeway	6630	0.95	Level	3	0	0.	985	1.00	70	34		
Ramp	720	0.92	Level	2	0	0.	990	1.00	79	0		
UpStream	1220	0.92	Level	2	0	0.	990	1.00	13:	39		
DownStream		 Mayor Araaa										
Estimation of	fv	werge Areas			Estimat	iono	<u>f</u> v	nverge Areas				
	12				LSumau		1 2					
	V ₁₂ = V _F	(P _{FM})					V ₁₂ =	V _R + (V _F - \	/ _R)P _{FD}			
L _{EQ} =	(Equa	ation 13-6 or	13-7)		L _{EQ} =		(Equation 13-	12 or 13-13)			
P _{FM} =	using	Equation (Exhibit 13-6)		P _{FD} =		0.4	436 using Ed	quation (Exhil	oit 13-7)		
V ₁₂ =	pc/h				V ₁₂ =		35	34 pc/h				
V ₃ or V _{av34}	pc/h (Equation 13	-14 or 13-17)		$V_3^{}$ or $V_{av34}^{}$		17	'75 pc/h (Eq	uation 13-14	or 13-17)		
Is V_3 or $V_{av34} > 2,70$	00 pc/h? 🗌 Ye	s 🗌 No			Is V_3 or V_{av3}	₃₄ > 2,7	00 pc/h? [Yes 🗹 No	1			
Is V_3 or $V_{av34} > 1.5$	* V ₁₂ /2	s 🗌 No			Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No							
If Yes.V ₄₀₋ =	pc/h (Equation 13	-16, 13-18, or		If Yes,V _{12a} = pc/h (Equation 13-16, 13-18, or 13-							
	13-19)				Capacity Chocks							
Capacity Che			N 11		Capacity Checks							
	Actual		apacity	LUSF?			Actual			LUS F?		
					V _F		7084	Exhibit 13	-8 9600	NO		
V _{FO}		Exhibit 13-8			$V_{FO} = V_{F}$	- V _R	6294	Exhibit 13	-8 9600	No		
					V _R		790	Exhibit 13-	10 2100	No		
Flow Entering	g Merge In	fluence A	lrea		Flow En	terin	g Divel	rge Influei	nce Area			
	Actual	Max	Desirable	Violation?		/	Actual	Max Desira	able	Violation?		
V _{R12}		Exhibit 13-8			V ₁₂	3	3534	Exhibit 13-8	4400:All	No		
Level of Serv	vice Detern	nination (if not F)		Level of Service Determination (if not F)							
D _R = 5.475 + 0	D _R = 5.475 + 0.00734 v _R + 0.0078 V ₁₂ - 0.00627 L _A						$D_{R} = 4.252 + 0.0086 V_{12} - 0.009 L_{D}$					
D _R = (pc/mi/lr	$D_{\rm R} = 35.0 ({\rm pc/mi/ln})$											
LOS = (Exhibit	13-2)				LOS = D	(Exhil	oit 13-2)					
Speed Deterr	mination				Speed L	Deter	minatio	n				
$M_0 = (Fxihit 1)$	3-11)				$D_{s} = 0.5$	369 (E	xhibit 13-	12)				
$S_{=}$ mph (Ev)					S _P = 50).7 mnh	(Exhibit	, 13-12)				
	$\frac{101110-11}{10140}$				$S_{0} = 7A$	l 5 mnh	(Exhibit	13-12)				
S = mnh (Ext	non 13-11) hihit 13-13)				S = 65	5 mob	(Evhibit	13_12)				
		Pighte Descrued						10-10)	Concratad: 5	25/2010 0.44		
yngnt ⊜ ∠u iu UlliveľSli	ty of FIUHUA, All R	agina reserved			HCS2010 ¹¹	versi	on 6.90		Generaleu. 5	"LJILUIS 9.45		

BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed Analysis Time Period	AECOM PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	l-95 SB Seg 11-L 2020 Bu	Bet Off Exp Off Sample ild 1				
Project Description SW 10t	h Street SIMR								
✓ Oper.(LOS))		Des.(N)	Pla	anning Data				
Flow Inputs									
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5910	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length Up/Down %	0.95 3 0 Level mi					
Calculate Flow Adjustr	nents								
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985					
Speed Inputs			Calc Speed Adj and FFS	6					
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph				
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1579 68.3 23.1 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed Analysis Time Period	AECOM PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	l-95 SB Seg 13-l 2020 Bu	Bet Off & On Ramps				
Project Description SW 10t	th Street SIMR		- ,		-				
✓ Oper.(LOS))		Des.(N)	Pla	nning Data				
Flow Inputs									
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	4800	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi					
Calculate Flow Adjust	ments		Up/Down %						
	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985					
Speed Inputs			Calc Speed Adj and FFS	6					
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph				
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1709 67.0 25.5 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design he	S - Speed D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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		-		VILAV		NOTILL				
General Info	ormatic	on			Site Information					
Analyst Agency/Company Date Performed Analysis Time Peri	od	AECON PM	И		Freeway/Dir Weaving Se Analysis Yea	of Travel gment Locati ar	I-95 S on Seg 2 2020	SB I4- Bet Samp Build 1	le & Copans	
Project Description	SW 10th	Street SIMF	2							
Inputs										
Neaving configura Neaving number o Neaving segment Freeway free-flow	tion f lanes, N length, L _s speed, FF	S		One-Sided 4 2520ft 70 mph Freeway maximum capacity, C _{IFL} Terrain type					Free 2 Le	
<u>Conversions</u>	s to pc	/h Unde	r Base Co	ondition	<u>s</u>					
V (v	/eh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF} 41	70	0.95	3	0	1.5	1.2	0.985	1.00	4455	
V _{RF} 14	20	0.92	2	0	1.5	1.2	0.990	1.00	1559	
V _{FR} 63	30	0.92	2	0	1.5	1.2	0.990	1.00	692	
√ _{RR} (0	0.95	0	0	1.5	1.2	1.000	1.00	0	
√ _{NW} 44	455							V =	6706	
V _W 2	251									
√R 0.:	336									
Configuratio	on Cha	racterist	tics							
Minimum maneuve	er lanes, N	I _{WL}		2 lc	Ic Minimum weaving lane changes, LC _{MIN} 2				2251	
Interchange densit	ty, ID			0.7 int/mi	ni Weaving lane changes, LC _w				2700	
Minimum RF lane	changes,	LC _{RF}		1 lc/pc	Non-weaving lane changes, LC_{NW}				1513	
Minimum FR lane	changes,	LC _{FR}		1 lc/pc	Total lane changes, LC _{ALL}				4213	
Minimum RR lane	changes,	LC _{RR}		lc/pc	Non-weaving vehicle index, I _{NW}				7	
Weaving Se	gment	Speed,	Density, I	Level of	Service,	and Ca	oacity			
Weaving segment	flow rate,	v		6618 veh/h	Weaving int	ensity factor,	W		0.3	
Weaving segment	capacity,	C _w		7044 veh/h	Weaving se	gment speed	l, S		48.8 r	
Weaving segment	v/c ratio			0.939	Average weaving speed, S _w				56.1 r	
Weaving segment	density, D)	34	4.4 pc/mi/ln	In Average non-weaving speed, S_{NW} 45				45.7 r	
Level of Service, L	.05			D	Maximum w	eaving lengtl	n, L _{MAX}		597	
Notes	- I "	46 1 - 1	te due av '	and the state of the			a sa al alta			
a vveaving segment	is longer th	an the calcula	ited maximum le	ength should	be treated as i	solated merge	and diverge a	eas using the	procedures	
Chapter 13, "Freewa	y Merge a	nd Diverge Se	egments".	ha lavel of	nvice is """					

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		F	REEWAY	WEAV	ING WOF	RKSHEE	Г			
Genera	Informatio	on			Site Info	rmation				
Analyst Agency/Con Date Perfori Analysis Tin	npany ned ne Period	AECOM AM	1		Freeway/Dir Weaving Seg Analysis Yea	Freeway/Dir of Travel I-95 NB Weaving Segment Location Seg 1-Bet Copans & Sample Analysis Year 2040 Build 1				
Project Des	cription SW 10th	n Street SIMR								
Inputs					1					
Weaving co Weaving nu Weaving se Freeway fre	nfiguration mber of lanes, N gment length, L _s e-flow speed, FF	Segment typ Freeway min Freeway ma: Terrain type	e imum speed, ximum capac	S _{MIN} ity, C _{IFL}		Freeway 15 2400 Level				
Convers	sions to po	h Under	^r Base Co	ondition	S			1	1	
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF}	4755	0.95	3	0	1.5	1.2	0.985	1.00	5080	
V _{RF}	405	0.92	2	0	1.5	1.2	0.990	1.00	445	
V _{FR}	970	0.92	2	0	1.5	1.2	0.990	1.00	1065	
V _{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0	
V _{NW}	5080							V =	6590	
V _W	1510							-		
VR	0.229									
Configu	ration Cha	racterist	ics		•					
Minimum m	aneuver lanes, N	N _{WL}		2 lc	Minimum we	1510 lc/h				
Interchange	density, ID			0.7 int/mi	Weaving lan	1945 lc/h				
Minimum R	F lane changes,	LC _{RF}		1 lc/pc	Non-weaving	g lane change	es, LC _{NW}		1566 lc/h	
Minimum Fl	R lane changes,	LC _{FR}		1 lc/pc	Total lane ch	nanges, LC _{ALI}	_		3511 lc/h	
Minimum R	R lane changes,	LC _{RR}		lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		846	
Weavin	g Segment	Speed, I	Density, I	_evel of	Service,	and Cap	acity			
Weaving se Weaving se	gment flow rate, gment capacity,	v c _w	6500 veh/h 8717 veh/h	Weaving inte Weaving seg	ensity factor, gment speed,	W S		0.307 52.5 mph		
Weaving se	gment v/c ratio	Average weaving speed, S _w				57.1 mph				
Weaving segment density, D 31.4 pc/mi/ln					Average non-weaving speed, $S_{_{\sf NW}}$				51.2 mph	
Level of Se	vice, LOS			D	Maximum weaving length, L _{MAX} 4836 ft					
Notes a. Weaving s Chapter 13, ' b. For volume	egments longer th Freeway Merge a es that exceed the	nan the calculat nd Diverge Se weaving segn	ted maximum le gments". nent capacity, th	ength should l	be treated as is	solated merge	and diverge ar	eas using the	procedures of	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
			Site information		
Analyst			Highway/Direction of Travel	I-95 NB Sea 2-B	et Off & On from
Agency or Company	AECOM		From/Io	Sample	
Date Performed Analysis Time Period	AM		Jurisdiction Analysis Year	2040 Bu	iild 1
Project Description SW 10	th Street SIMR				
✓ Oper.(LOS)		Des.(N)	🗌 Pla	anning Data
Flow Inputs					
Volume, V	5160	veh/h	Peak-Hour Factor, PHF	0.95	
AADT		veh/day	%Trucks and Buses, P _T	3	
Peak-Hr Prop. of AADT, K			%RVs, P _R	0	
Peak-Hr Direction Prop, D		voh/h	General Terrain:	Level	
		ven/n	Grade % Length	ΠΙ	
Coloulato Flour Adiust			Op/Down //		
Calculate Flow Adjust	ments				
f _p	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	5	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	3		f _{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS	5	mph			·
LOS and Performance	Measures		Design (N)		
			Design (N)		
			Design LOS		
$v_p = (V \text{ or } DDHV) / (PHF X N)$	x f _{HV} x f _p) 1838	pc/h/ln	$v_{p} = (V \text{ or DDHV}) / (PHF x N x)$	f _{HV} x f _n)	pc/h/ln
S	65.3	mph	S	nv p	mph
$D = v_p / S$	28.2	pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	D		Required Number of Lanes, N		·
Glossary			Factor Location		
N - Number of lanes	S - Speed				
V - Hourly volume	D - Densitv		E _R - Exhibits 11-10, 11-12		t _{LW} - Exhibit 11-8
v _n - Flow rate	FFS - Free-flow	speed	E_{T} - Exhibits 11-10, 11-11, 11	-13	t _{LC} - Exhibit 11-9
LOS - Level of service	BFFS - Base fre	ee-flow speed	f _p - Page 11-18		TRD - Page 11-11
DDHV - Directional design h	our volume	-1	LOS, S, FFS, v _p - Exhibits 11-	2, 11-3	

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Job: SW 10th Street SIMR Analyst: AECOM



<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	7,073	0.74	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,513	0.77	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,552	0.74	No

BASIC FREEWAY SEGMENTS WORKSHEET										
			-							
General Information			Site Information							
Analyst			Highway/Direction of Travel	I-95 NB						
Agency or Company	AECOM		From/To	Seg 4-Be	et On from Sample &					
Date Performed Analysis Time Period	AM		Jurisdiction Analysis Year	2040 Bu	ild 1					
Project Description SW 10th	n Street SIMR									
Oper.(LOS)			Des.(N)	Pla	nning Data					
Flow Inputs										
Volume, V AADT Peak-Hr Prop. of AADT, K	6620	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R	0.95 3 0						
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade 0.00% Length Up/Down %	Grade 0.00mi 0.00						
Calculate Flow Adjustn	nents									
f _p	1.00		E _R	1.2						
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985						
Speed Inputs			Calc Speed Adj and FF	S						
Lane Width		ft								
Rt-Side Lat. Clearance		ft	f _{LW}		mph					
Number of Lanes, N	4		f _{LC}		mph					
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph					
FFS (measured)	70.0	mph	FFS	70.0	mph					
Base free-flow Speed, BFFS		mph			·					
LOS and Performance	Measures		Design (N)							
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N > S D = v _p / S LOS	x f _{HV} x f _p) 1768 66.3 26.7 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln					
Glossary			Factor Location							
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11 f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11					

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General Infor	mation			Site Inform	nation	-			
Analyst			Fn	eeway/Dir of Tra		95 NB			
Agency or Company	AECO	M	lu lu	nction	Seg 5-On from Exp				
Date Performed	ALO		Ju	risdiction	0		νþ		
Analysis Time Period	AM		Ar	alvsis Year	2	040 Build 1			
Project Description	SW 10th Stree	t SIMR							
Inputs									
Instream Adi Pamp		Freeway Num	per of Lanes, N	4				Downstr	oam Adi
opstream Auj Namp	1				Ramp	ean Auj			
Yes On Acceleration I are Length I									
		Decoloration L	ano Longth L	1000				I Yes	On
✓ No 🗌 Of				6600				🗌 No	✓ Off
= #			ne, v _F	0020				I. =	6200 ft
-ир п		Ramp volume	, v _R	920				-down	0200 11
/= veh/h		Freeway Free-	Flow Speed, S _{FF}	70.0				V _D =	1320 veh/h
u		Ramp Free-Flo	ow Speed, S _{FR}	50.0					
Conversion to	p pc/h Und	der Base (Conditions	1			1		
(pc/h)	v (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PH	IF x f _{HV} x f _p
Freeway	6620	0.95	Level	3	0	0.985	1.00		7073
Ramp	920	0.92	Level	2	0	0.990	1.00		1010
UpStream									
DownStream	1320	0.92	Level	2	0	0.990	1.00		1449
		Merge Areas					Diverge Areas	6	
Estimation of	v ₁₂				Estimatio	on of v ₁₂			
	V ₁₂ = V _F	(P _{FM})				\/ -			
= =	(Equa	ation 13-6 or	13-7)			v 12 -		'R ^{JI} FD	10)
P, =	0 092	$L_{EQ} = (Equation (Exhibit 13.6))$				(Equation 1	1 13 - 12 0 13 - 13)		
FM / —	640 -				P _{FD} =		using Equat	tion (Exhibit	13-7)
/ 12 -	040 p	U/II	m 10 11 am 10		V ₁₂ =		pc/h		
/ ₃ or V _{av34}	3212 17)	oc/n (Equalic	on 13-14 of 13-		$V_3^{}$ or $V_{av34}^{}$		pc/h (Equation	n 13-14 or 13	-17)
Is V ₂ or V ₂₁₂₄ > 2.70	0 pc/h? 🔽 Ye	s 🗌 No			Is V ₃ or V _{av34}	> 2,700 pc/h?	Yes 🛛 N	0	
$1 \text{ s V}_{\circ} \text{ or V}_{\circ} > 1.5$					Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No				
av34	2829	oc/h (Equatio	n 13-16 13-		pc/h (Equation 13-16, 13-18, or				
f Yes,V _{12a} =	18, or	13-19)	JI 10-10, 10-		12a -	1	3-19)		
Capacity Che	cks				Capacity	Checks			
	Actual	С	apacity	LOS F?		Actual	C	Capacity	LOS F?
					V _F		Exhibit 1	3-8	
Vro	8083	Exhibit 13-8		No	V _{FO} = V _F -	V _R	Exhibit 1	3-8	
FU					\/		Exhibit 1	13-	
					۷R		10		
-low Entering	Merge In	fluence A	rea		Flow Ent	ering Dive	erge Influe	ence Are	a
14	Actual	Max [Violation?	17	Actual	Max De		Violation?
V _{R12}	41/8		4000:All	N0		Comilas D) ion /:f	(F)
						Service De			
υ _R = 0.4/5 +	0.00734V _R +(UUZI LA		D	_R = 4.252 + (.0000 V ₁₂ -	0.009 L _D	
_R = 30.0 (pc/m	ı/In)				u _R = (pc	/mi/ln)			
LOS = D (Exhibit 13-2)					LOS = (Exhibit 13-2)				
Speed Determination					Speed De	eterminati	on		
Speed Detern	M _e = 0.425 (Exibit 13-11)					D _s = (Exhibit 13-12)			
Speed Detern M _S = 0.425 (Exil	oit 13-11)			ſ	5 (,			
Speed Detern M _S = 0.425 (Exil S _P = 58.1 mph (bit 13-11) Exhibit 13-11)				S _R = mph	n (Exhibit 13-12)		
Speed Detern $M_{\rm S}$ = 0.425 (Exil $S_{\rm R}$ = 58.1 mph (bit 13-11) Exhibit 13-11) Exhibit 13-11)				S _R = mph S ₀ = mph	n (Exhibit 13-12 n (Exhibit 13-12)		
Speed Determ $M_{\rm S}$ = 0.425 (Exil $S_{\rm R}$ = 58.1 mph ($S_{\rm O}$ = 65.2 mph ($S_{\rm C}$ = 61.2 mph (bit 13-11) Exhibit 13-11) Exhibit 13-11) Exhibit 13-13)				S _R = mpł S ₀ = mpł S = mpł	n (Exhibit 13-12 n (Exhibit 13-12 n (Exhibit 13-13))		

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company AECOM Date Performed Analysis Time Period AM			Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 NB Seg 6-Bet Exp On & Off to 10 2040 Build 1	
Project Description SW 10t	h Street SIMR		-		
✓ Oper.(LOS)			Des.(N)	Pla	inning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	7540	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi	
Calculate Flow Adjustr	nents				
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 2685 44.4 60.4 F	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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BASIC FREEWAY SEGMENTS WORKSHEET										
General Information			Site Information							
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 8-Be	et Off & Off Ramps					
Analysis Time Period	AM b Street SIMR		Analysis Year	2040 BU	lia 1					
Oper (LOS)			Des (N)	Pla	nning Data					
Flow Inputs										
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	6220	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain:	0.95 3 0 Level						
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	ті						
Calculate Flow Adjustn	nents									
f _p	1.00		E _R	1.2						
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985						
Speed Inputs		Calc Speed Adj and FFS	6							
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph					
LOS and Performance	Measures		Design (N)							
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p) 2215 58.0 38.2 E	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x S)$ $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln					
Glossary			Factor Location							
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11					

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		RAMF	'S AND RAM	P JUNCTI	ONS WOR	RKSHEET				
General Infor	mation			Site Infor	mation					
Analyst Agency or Company	AEC	OM	Fr Ju	eeway/Dir of Tr inction	avel I. S	-95 NB Seg 9-Off to Hills	boro EB&WB			
Date Performed Analysis Time Period	ΔM		JU Ar	irisoliction nalvsis Year	2	040 Build 1				
Project Description	SW 10th Stree	et SIMR	74		2					
Inputs										
Linstream Adi P	amn	Freeway Nur	nber of Lanes, N	3				Downstr	am Adi	
opstream Auj N	ump	Ramp Numb	er of Lanes, N	1				Ramp	Jani Auj	
Yes	On	Acceleration	Lane Length, L _₄					Ves	🔽 On	
No]∩ff	Deceleration	eceleration Lane Length L _D 200							
		Freeway Volu	ume, V _F	6220				□ No	∐ Off	
L _{up} = ff	t	Ramp Volum	e, V _P	1450				L _{down} =	2800 ft	
		Freeway Free	e-Flow Speed, S _{FF}	70.0				<u> </u>	1000	
$V_u = ve$	eh/h	Ramp Free-F	low Speed, SED	45.0				v _D -	1660 Ve	
Conversion to	o pc/h Un	der Base	Conditions					1		
(po/b)	V		Torrain	% Truck	0/ Dv	f	f		Evf v	
(pc/ii)	(Veh/hr)	ГПГ	Terrain	/0 TTUCK	/01.1	'HV	'p	v = v/i ii	• • • _{HV} •	
Freeway	6220	0.95	Level	3	0	0.985	1.00		646	
Ramp	1450	0.92	Level	2	0	0.990	1.00	´	1592	
DownStream	1660	0.92		2	0	0 990	1 00	<u> </u>	1822	
Downouloum	1000	Merge Areas	LOVOI	2	•	0.000	Diverge Areas		1022	
Estimation of	V ₁₂				Estimati	on of v_{12}				
	$V_{40} = V_{F}$	(P _{EM})				V ₄₀	= V _D + (V _E -)			
L _{F0} =	(Fauz	tion 13-6 o	r 13-7)		L _{ro} =	12	(Fouation 13	-12 or 13-1	3)	
P _{FM} =	usina	Equation (Exhibit 13-6)			C	.521 using F	quation (Fx	-) hibit 13-7)	
V ₁₂ =	pc/h				V ₁₂ =	4	223 pc/h			
V_3 or $V_{2\sqrt{34}}$	pc/h ((Equation 13	3-14 or 13-17)		V_{3}^{12} or V_{2V34}^{12}	2	423 pc/h (Ea	uation 13-	14 or 13-1	
Is V_3 or $V_{2\sqrt{24}} > 2,70$	0 pc/h? □ Ye	s 🗌 No	,		Is V ₃ or V _{av34} > 2,700 pc/h? □ Yes ☑ No					
Is V_3 or $V_{3\sqrt{24}} > 1.5$ *	V ₁₂ /2 □Ye	s 🗌 No			$ _{\rm SV_3 or V_{av34}} > 1.5 * V_{12}/2 $ Yes \checkmark No					
	pc/h ((Equation 13	3-16, 13-18, or		pc/h (Equation 13-16, 13-18, or 13-					
1 103, V _{12a}	13-19)			19)					
Capacity Che	CKS	1	<u> </u>		Capacity	Checks				
	Actual			LUSF?	V	Actua			LUS	
V		E			v _F	0040		7200	INO	
♥ FO		EXHIDIL 13-0			$v_{FO} - v_F$	- v _R 5054		10 0400	INO	
					V _R	1592	Exhibit 13	-10 2100	No	
Flow Entering	y Merge In	nfluence A	Area	Violotion2	Flow Ent	tering Dive	erge Influe	nce Area		
V	Actual	IVIAX		Violation?	V	Actual	Evhibit 12.9		Violatio	
^v R12	ion Dotorr	EXHIBIT 13-0	(if not E)			4220 Sorvice De		4400.All		
$D = 5.475 \pm 0.000$						$= 4.252 \pm 0$				
D = (nc/mi/ln)				$D_{\rm R} = 4.232 \pm 0.0000 v_{12} = 0.009 L_{\rm D}$						
$\Gamma_{\rm K}$ (point) I OS = (Exhibit 13-2)				$P_{\rm R}^{-}$ 38.8 (pc/mi/in)						
Encod Determination				LUS = E (Exhibit 13-2)						
Speed Detern	mation									
™ _S = (Exibit 13	3-11)				$U_{\rm s} = 0.441$ (Exhibit 13-12)					
ଞ _R = mph (Exh	ibit 13-11)				S _R - 5/.	o mpri (Exhibi 2 mpri (Estatio	13-12)			
S ₀ = mph (Exh	ibit 13-11)				$S_0 = 71.$	∠ mpn (Exnibi o mak (E i i i i	L 13-12)			
o – mpn (⊨xn	IUIL 13-13)				S = 62.	u mpn (Exhibi	(13-13)	<u> </u>	F 100	
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2040 Build 1 Freeway HCS Operational Analysis

BASIC FREEWAY SEGMENTS WORKSHEET										
General Information			Site Information							
Analyst Agency or Company AECOM Date Performed			Highway/Direction of Travel From/To Jurisdiction	l-95 NB Seg 10-l	Bet Off & On Ramps					
Analysis Time Period AM		Analysis Year	2040 Build 1							
Project Description SW 10t	h Street SIMR									
✓ Oper.(LOS))		Des.(N)	Pla	inning Data					
Flow Inputs										
Volume, V AADT	4770	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3						
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi						
Calculate Flow Adjustr	nents									
f _p	1.00		E _R	1.2						
É _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985						
Speed Inputs			Calc Speed Adj and FFS	5						
Lane Width Rt-Side Lat, Clearance		ft ft	f		mph					
Number of Lanes, N	3	romno/mi	f _{LC}		mph					
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph					
LOS and Performance	Measures		Design (N)							
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1699 67.1 25.3 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln					
Glossary			Factor Location							
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11					

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RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Infor	mation			Site Infor	mation					
Analyst			Fre	eeway/Dir of Tr	avel	I-95 N	IB		_	
Agency or Company	AECO	MC	Ju	nction		Seg 1	1-On Ramp 10	Oth St EB & W	В	
Date Performed			Ju	risdiction						
Analysis Time Period	AM		An	alysis Year		2040	Build 1			
	SW 10th Stree	t SIMK								
mputs		Erooway Num	bor of Lanos N	2						
Upstream Adj Ramp		Pomp Numbo	r of Lanos N	3					Downstrea Bomp	m Adj
🗹 Yes 🛛 On		Acceleration L	1200							
		Deceleration L	ane Length L _D						∐ Yes	
		Freeway Volu	me, V _F	4770					No No	U Off
L _{up} = 2800 f	ft	Ramp Volume	, V _R	1660					L _{down} =	ft
V = 1450 v	oh/h	Freeway Free	-Flow Speed, S_{FF}	70.0					V., =	veh/h
^v u 1430 V	en/m	Ramp Free-Fl	ow Speed, S _{FR}	50.0					U	
Conversion to	o pc/h Uno	der 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	4770	0.95	Level	3	0	(0.985	1.00	50)96
Ramp	1660	0.92	Level	2	0	(0.990	1.00	18	322
UpStream	1450	0.92	Level	2	0	(0.990	1.00	1:	592
DownStream										
Estimation of	V	Merge Areas			Fstimat	ion		erge Areas		
	<u>12</u>	(P)					12			
. =	v ₁₂ - v _F	(「 _{FM}) (Equation	12.6 or 12.7				V ₁₂ = V _F	_R + (V _F - V _R))P _{FD}	
EQ =	0.611	ucing Equat	13-0.01 13-7		L _{EQ} =		(E	quation 13-	12 or 13-13	3)
' FM V =	311/	using Equat			P _{FD} =		us	ing Equatio	n (Exhibit 13	-7)
* 12 V) (1982	oc/h (Equatio	on 13-14 or 13-		V ₁₂ =		рс	:/h		_,
V ₃ or V _{av34}	17)				V_3 or V_{av34}	. 0		/h (Equation 1	3-14 or 13-1	()
Is V ₃ or V _{av34} > 2,700) pc/h? 🗌 Ye	s 🗹 No			$15V_3 01V_{av}$	₃₄ ~ 2, > 1	5 * V /2			
Is V ₃ or V _{av34} > 1.5 *	V ₁₂ /2	s 🗌 No			$p_{12} = \frac{1}{2} p_{12} = \frac{1}{2} p_{1$					
lf Yes,V _{12a} =	3114 18. or	pc/h (Equatio 13-19)	on 13-16, 13-		If Yes,V _{12a} =	=	13-	19)	110 10, 10	10, 01
Capacity Chee	cks	/			Capacity Checks					
	Actual	C	apacity	LOS F?			Actual	Сар	acity	LOS F?
					V _F			Exhibit 13-8	3	
V _{FO}	6918	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V _R		Exhibit 13-8	3	
					V _R			Exhibit 13-	-	
Elow Entering	ı Merae In	I I Influence A	rea		Flow Fr	nteri	na Divero	e Influen	ce Area	
	Actual	Max	Desirable	Violation?			Actual	Max Desi	rable	Violation?
V _{R12}	4936	Exhibit 13-8	4600:All	Yes	V ₁₂			Exhibit 13-8		
Level of Servi	ice Detern	nination (if not F)		Level of	f Sei	rvice Dete	erminatio	n (if not	F)
$D_{R} = 5.475 + 0.00734 v_{R} + 0.0078 V_{12} - 0.00627 L_{A}$						D _R =	4.252 + 0.0	086 V ₁₂ - 0.	009 L _D	
D _R = 35.6 (pc/mi/ln)					D _R = (pc/mi/ln)					
LOS = E (Exhibit 13-2)					LOS = (E	Exhib	it 13-2)			
Speed Determ	nination				Speed L	Dete	rmination	1		
M _S = 0.744 (Exib	oit 13-11)				D _s = (E	xhibit	13-12)			
S_R = 49.2 mph (Exhibit 13-11) S_R = mph (Exhibit 13-12)										
S ₀ = 64.7 mph (I	Exhibit 13-11)				S ₀ = m	ph (E>	khibit 13-12)			
S = 52.8 mph (Exhibit 13-13) $S = mph (Exhibit 13-13)$										

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BASIC FREEWAY SEGMENTS WORKSHEET										
General Information			Site Information							
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To	l-95 NB Seg 12-l	Bet On Ramps					
Analysis Time Period	AM		Analysis Year	2040 Bu	iild 1					
Project Description SW 10th	n Street SIMR									
Oper.(LOS)			Des.(N)	Pla	anning Data					
Flow Inputs										
Volume, V AADT	6430	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3						
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi						
Calculate Flow Adjustn	nents									
f _p	1.00		E _R	1.2						
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985						
Speed Inputs			Calc Speed Adj and FFS	6						
Lane Width		ft								
Rt-Side Lat. Clearance		ft	f _{LW}		mph					
Number of Lanes, N	3		t _{LC}		mph					
Total Ramp Density, TRD	70.0	ramps/mi	IRD Adjustment		mph					
FFS (measured)	70.0	mpn	FFS	70.0	mph					
Base free-flow Speed, BFFS		mpn								
LOS and Performance	Measures		Design (N)							
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N > S D = v _p / S LOS	x f _{HV} x f _p) 2290 56.2 40.7 E	pc/h/ln mph pc/mi/ln	<u>Design (N)</u> Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln					
Glossary			Factor Location							
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11					

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		F	REEWAY	WEAV	ING WOF	RKSHEE	Г			
General	Informatio	on			Site Info	rmation				
Analyst Agency/Con Date Perforr Analysis Tin	Analyst Agency/Company AECOM Date Performed Analysis Time Period AM					Freeway/Dir of Travel I-95 NB Weaving Segment Location Seg 13-Bet On & Off to Exp Analysis Year 2040 Build 1				
Project Des	cription SW 10th	n Street SIMR			-					
Inputs					1					
Weaving configurationTwo-SidedWeaving number of lanes, N4Weaving segment length, L _s 4600ftFreeway free-flow speed, FFS70 mph					Segment typ Freeway min Freeway ma: Terrain type	e imum speed, ximum capac	, S _{MIN} ity, C _{IFL}		Freeway 15 2400 Level	
Convers	sions to po	:/h Unde	r Base Co	ondition	s		1			
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF}	5010	0.95	3	0	1.5	1.2	0.985	1.00	5353	
V _{RF}	1150	0.92	2	0	1.5	1.2	0.990	1.00	1263	
V _{FR}	1420	0.92	2	0	1.5	1.2	0.990	1.00	1559	
V _{RR}	320	0.92	2	0	1.5	1.2	0.990	1.00	351	
V _{NW}	8175							V =	8526	
V _w	351							-	-	
VR	0.041									
Configu	ration Cha	racterist	ics		•					
Minimum m	aneuver lanes, N	N _{WL}		0 lc	Minimum weaving lane changes, LC _{MIN}				1053 lc/h	
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC_w				1679 lc/h	
Minimum R	F lane changes,	LC _{RF}		0 lc/pc	Non-weaving lane changes, LC _{NW}				3512 lc/h	
Minimum Fl	R lane changes,	LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{ALI}	L		5191 lc/h	
Minimum R	R lane changes,	LC_{RR}		3 lc/pc	Non-weaving vehicle index, I _{NW} 26					
Weavin	g Segment	Speed,	Density, I	_evel of	Service,	and Cap	oacity			
Weaving se Weaving se	gment flow rate, gment capacity,	v c _w		8415 veh/h 9001 veh/h	Weaving intensity factor, W Weaving segment speed, S				0.249 52.4 mph	
Weaving segment v/c ratio 0.935					Average weaving speed, S _w				59.0 mph	
Weaving segment density, D 40.6 pc/mi/ln				Average non-weaving speed, S _{NW}				52.2 mph		
Level of Sel	VICE, LUS			E	Maximum weaving length, L _{MAX} 6110 ft					
Notes a. Weaving s Chapter 13, " b. For volume	egments longer th Freeway Merge a es that exceed the	nan the calcula nd Diverge Se weaving segr	ted maximum le gments". nent capacity, th	ength should l	be treated as is rvice is "F".	olated merge	and diverge an	eas using the	procedures of	

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BASIC FREEWAY SEGMENTS WORKSHEET										
General Information			Site Information							
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 14-I	North of Hillsboro					
Analysis Time Period AM			Analysis Year	2040 Bu	ild 1					
	i Street Simik				unning Data					
Flow Inputs			Jes.(N)							
Volume, V AADT	6160	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 4						
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi						
Calculate Flow Adjustn	nents									
f _p	1.00		E _R	1.2						
	1.5		$HV = W[HT_T(L_T - I) + R(L_R - I)]$	0.900						
Speed inputs			Calc Speed Adj and Fra	>						
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph					
LOS and Performance	Measures		Design (N)							
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p) 1653 67.6 24.4 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x S)$ $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln					
Glossary			Factor Location							
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11					

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		F	REEWAY	WEAV	ING WOF	RKSHEE	Г			
Genera	Informatio	on			Site Info	rmation				
Analyst Agency/Con Date Perfori Analysis Tin	Analyst Agency/Company AECOM Date Performed Analysis Time Period PM				Freeway/Dir of Travel I-95 NB Weaving Segment Location Seg 1-Bet Copans & Sample Analysis Year 2040 Build 1					
Project Des	cription SW 10th	n Street SIMR								
Inputs										
Weaving configurationOne-SidedWeaving number of lanes, N4Weaving segment length, Ls2380ftFreeway free-flow speed, FFS70 mph					Segment typ Freeway min Freeway ma: Terrain type	e imum speed, ximum capac	, S _{MIN} ity, C _{IFL}		Freeway 15 2400 Level	
Conver	sions to po	/h Unde	r Base Co	ondition	s		1	Ĩ	-	
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF}	4770	0.95	3	0	1.5	1.2	0.985	1.00	5096	
V _{RF}	480	0.92	2	0	1.5	1.2	0.990	1.00	527	
V _{FR}	1810	0.92	2	0	1.5	1.2	0.990	1.00	1987	
V _{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0	
V _{NW}	5096		•		-		-	V =	7610	
V _W	2514							-		
VR	0.330									
Configu	ration Cha	racterist	ics		•					
Minimum m	aneuver lanes, N	N _{WL}		2 lc	Minimum weaving lane changes, LC _{MIN} Id					
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC _w					
Minimum R	F lane changes,	LC _{RF}		1 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		lc/h	
Minimum Fl	R lane changes,	LC _{FR}		1 lc/pc	Total lane ch	nanges, LC _{ALI}	L		lc/h	
Minimum R	R lane changes,	LC_{RR}		lc/pc	Non-weaving vehicle index, I _{NW}					
Weavin	g Segment	Speed,	Density, I	_evel of	Service,	and Cap	oacity			
Weaving segment flow rate, v7511 veh/hWeaving segment capacity, c_w7158 veh/h				Weaving inte Weaving seg	ensity factor, gment speed	W , S		mph		
Weaving segment v/c ratio 1.049					Average weaving speed, S_w n				mph	
Weaving segment density, D pc/mi/ln				Average non-weaving speed, S_{NW}				mph		
Level of Service, LOS F				F	Maximum weaving length, L _{MAX} 5912 ft					
Notes a. Weaving s Chapter 13, ' b. For volume	egments longer th Freeway Merge a es that exceed the	nan the calcula nd Diverge Se weaving segr	ted maximum le gments". nent capacity, th	ength should l	be treated as is rvice is "F".	solated merge	and diverge ar	eas using the	procedures of	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
Concret Information			Site Information		
			Site Information		
Analyst			Highway/Direction of Travel	I-95 NB Sea 2-B	et On & On from
Agency or Company	AECOM		From/Io	Sample	
Date Performed Analysis Time Period	PM		Jurisdiction Analysis Year	2040 Bu	iild 1
Project Description SW 10	th Street SIMR				
Oper.(LOS	5)		Des.(N)	🗌 Pla	anning Data
Flow Inputs					
Volume, V	5250	veh/h	Peak-Hour Factor, PHF	0.95	
AADT		veh/day	%Trucks and Buses, P _T	3	
Peak-Hr Prop. of AADT, K			%RVs, P _R	0	
Peak-Hr Direction Prop, D		voh/h	General Terrain:	Level	
		Venin	Up/Down %	1111	
Calculato Elow Adjust	monte				
	interits				
r _p	1.00		E _R	1.2	
E _T	1.5		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985	
Speed Inputs			Calc Speed Adj and FFS	5	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	3		f _{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS	6	mph			
LOS and Performance	e Measures		Design (N)		
			Design (N)		
$\frac{\text{Operational}(LOS)}{(LOS)}$			Design LOS		
$v_p = (V \text{ or } D D H V) / (P H F X N)$	I X T _{HV} X T _p) 1870	pc/n/in	v _p = (V or DDHV) / (PHF x N x	f _{HV} x f _n)	pc/h/ln
S / C	64.8	mph	S	p	mph
$D = v_p / S$	28.9	pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	D		Required Number of Lanes, N		-
Glossary			Factor Location		
N - Number of lanes	S - Speed				
V - Hourly volume	D - Density		E_{R} - Exhibits 11-10, 11-12	10	t _{LW} - Exhibit 11-8
v _n - Flow rate	FFS - Free-flow	speed	E_{T} - Exhibits 11-10, 11-11, 11-	-13	t _{LC} - Exhibit 11-9
LOS - Level of service	BFFS - Base fre	ee-flow speed	t _p - Page 11-18		TRD - Page 11-11
DDHV - Directional design h	our volume		LOS, S, FFS, v _p - Exhibits 11-	2, 11-3	

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Job: SW 10th Street SIMR Analyst: AECOM



<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,838	0.71	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,609	0.78	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,223	0.58	No

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst			Highway/Direction of Travel	1-95 NB	at On from Somalo P
Agency or Company	AECOM		From/To	Seg 4-ы Ехр	el On nom Sample &
Date Performed Analysis Time Period	PM		Jurisdiction Analysis Year	2040 Bu	ild 1
Project Description SW 10	h Street SIMR				
Oper.(LOS	5)		Des.(N)	🗌 Pla	nning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K	6400	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R	0.95 3 0	
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade 0.00% Length Up/Down %	Grade 0.00mi 0.00	
Calculate Flow Adjust	ments				
f _p	1.00		E _R	1.2	
Ε _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	S	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f _{LW}		mph
Number of Lanes, N	4		f _{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS	3	mph			
LOS and Performance	e Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	l x f _{HV} x f _p) 1709 67.0 25.5 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	t f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
	C Cread				
V - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design h	5 - Speea D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11
<u>.</u>					

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General Info	rmation			Site Infor	mation				
Analyst	mation		E	reeway/Dir of Tr		95 NR			
Adonov or Company		214		inction	Idvei I-90 ND				
Date Performed	AEC	JIVI	JI JI	risdiction	c	eg 5-011101	ιΞxμ		
Analysis Time Perio	d PM		A	nalvsis Year	2	040 Ruild 1			
Project Description	SW 10th Stree	t SIMR				o to Build T			
Inputs									
Instroom Adi Domo		Freeway Num	ber of Lanes, N	4				Downot	oom Adi
Spatieani Auj Ramp)	Ramp Numbe	r of Lanes, N	1				Ramp	eani Auj
Yes O	n	Acceleration I	ane Length, L.	1500					
		Deceleration I	ane Length L	1000				IM Yes	L On
✓ No O	ff	Erooway Valu		6400				🗌 No	✓ Off
$= ft \qquad Pomp Volume V \qquad 7'$								L _{daum} =	6200 ft
rup Rainp volume, v _R								down	
/ = veh/h								V _D =	1590 veh/h
<u> </u>		Ramp Free-Fl	ow Speed, S _{FR}	50.0					
Conversion t	to pc/h Und	der Base	Conditions	1	1				
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/Pł	HF x f _{HV} x f _p
Freeway	6400	0.95	Level	3	0	0.985	1.00		6838
Ramp	770	0.92	Level	2	0	0.990	1.00		845
UpStream									
DownStream	1590	0.92	Level	2	0	0.990	1.00		1746
Estimation o	f 1/	Merge Areas			Ectimotic	on of v	Diverge Areas	5	
	12				LSumain	12			
	V ₁₂ = V _F	(P _{FM})				V ₁₂	= V _R + (V _F - V	/ _B)P _{ED}	
_{EQ} = (Equation 13-6 or 13-7)						12	(Equation 1)	3-12 or 13	-13)
P _{FM} =	0.112	using Equat	ion (Exhibit 13-6)	FEQ P =			tion (Evhibit	13 7)
√ ₁₀ =	767 p	c/h	,		FD				13-7)
12	3035	oc/h (Equati	on 13-14 or 13-		v ₁₂ =		pc/n		
V ₃ or V _{av34}	17)				V ₃ or V _{av34}		pc/h (Equatior	n 13-14 or 13	3-17)
Is V ₃ or V _{av34} > 2,70	00 pc/h? 🔽 Ye	s 🗌 No			Is V_3 or V_{av34}	> 2,700 pc/h	? 🗌 Yes 🗌 N	0	
Is V_3 or $V_{av34} > 1.5$	* V ₁₂ /2 Yes	s 🗌 No			Is V_3 or V_{av34}	> 1.5 * V ₁₂ /2	Yes N	0	
	2735	pc/h (Equati	on 13-16, 13-		If Yes,V _{12a} =		pc/h (Equat	ion 13-16,	13-18, or
11es, v _{12a} –	18, or	13-19)	-		120	_	13-19)		
Capacity Che	ecks	r			Capacity	Checks			
	Actual		apacity	LOS F?		Actu		apacity	LOS F?
					V _F		Exhibit 1	3-8	_
V _{FO}	7683	Exhibit 13-8		No	$V_{FO} = V_{F}$ -	V _R	Exhibit 1	3-8	
					Vp		Exhibit 1	3-	
		<u> </u>					10		
Flow Enterin	g werge in	Max	A rea Desirable	Violation?	FIOW Ent	ering Div	/erge Influe	ence Are	a Violation?
Vpro	3908	Exhibit 13-8	4600·All	No	Via	Actual	Exhibit 13-8		VIOIDUOITE
l evel of Serv	vice Detern	nination (if not F)	110	l evel of	L Service I	Determinati	ion (if no	
$D_{\rm p} = 5.475 +$	+ 0.00734 v _ + (0.0078 V ₄₀ - 0.1	00627 L.			$_{\rm p} = 4.252$	+ 0.0086 V	0.0091~	/
r = 27.9 (nc/r)	ni/ln)	12	A		$D_n = (n)$	/mi/ln)	12	U	
	······					/hibit 12 2\			
	minctic -						tion		
speea Deteri	mination				speea D		иоп		
M _S = 0.365 (Ex	ibit 13-11)				υ _s = (Ex	nidit 13-12)	40		
S _R = 59.8 mph	(Exhibit 13-11)				⊳ _R = mp	n (Exhibit 13-	12)		
S ₀ = 65.4 mph	(Exhibit 13-11)				S ₀ = mp	h (Exhibit 13-	12)		
S = 62.3 mph	(Exhibit 13-13)				S = mp	h (Exhibit 13-	13)		
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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company Date Performed Analysis Time Period	AECOM PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 NB Seg 6-Bet Exp On & Off to 10 2040 Build 1		
Project Description SW 10t	h Street SIMR					
✓ Oper.(LOS))		Des.(N)	Pla	inning Data	
Flow Inputs						
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	7170	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi		
Calculate Flow Adjust	nents					
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	S		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 2554 48.7 52.4 F	pc/h/ln mph pc/mi/ln	Design (N) Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company Date Performed Analysis Time Period	AECOM PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 NB Seg 8-Bet Off & Off Ramps		
Project Description SW 10t	th Street SIMR			2040 Du		
✓ Oper.(LOS))		Des.(N)	Pla	nning Data	
Flow Inputs	·					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5580	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi		
			Up/Down %			
Calculate Flow Adjustr	ments					
^τ ρ Ε _Τ	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	8		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1987 62.8 31.6 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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		RAMF	'S AND RAM	P JUNCTI	ONS WOF	RKSHEET			
General Infor	mation			Site Infor	mation				
Analyst Agency or Company	AEC	ОМ	Fr Ju	eeway/Dir of Tr	avel I- S	-95 NB Seg 9-Off to Hills	boro EB&WB		
Date Performed	PM		Ju Δr	irisdiction nalvsis Year	2	040 Build 1			
Project Description	SW 10th Stree	et SIMR		1019515 1 Cal	2				
Inputs									
Linstroom Adi Di		Freeway Nur	nber of Lanes, N	3				Downstre	am Adi
Opstream Auj R	апр	Ramp Numb	er of Lanes, N	1				Ramp	ann Auj
Yes	On	Acceleration	Lane Length, L _A					✓ Yes	🗹 On
✓ No	Off	Deceleration	Deceleration Lane Length L _D 200					□ No	Off
		Freeway Volu	ume, V _F	5580					2800 fi
L _{up} = 1	[Ramp Volum	Ramp Volume, V _R 1440					down	2000 11
V _µ = veh/h Freeway Free-Flow Speed, S _{FF} 70.0				70.0				V _D =	1320 veh
0	//	Ramp Free-F	now Speed, S _{FR}	45.0					
Conversion to	o pc/n Un	der Base	Conditions	1	<u> </u>	<u> </u>		1	
(pc/h)	v (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PH	$F \ge f_{HV} \ge f_p$
Freeway	5580	0.95	Level	3	0	0.985	1.00	5	962
Ramp	1440	0.92	Level	2	0	0.990	1.00	1	581
UpStream									
DownStream	1320	0.92	Level	2	0	0.990	1.00	1	449
Estimation of		Ectimotic	on of v	Diverge Areas					
Estimation of V ₁₂					Estimatio	511 01 V ₁₂			
	V ₁₂ = V _F	(P _{FM})				V ₁₂ =	= V _R + (V _F - \	/ _R)P _{FD}	
L _{EQ} =	(Equa	ation 13-6 oi	r 13-7)		L _{EQ} =		Equation 13-	12 or 13-1	3)
P _{FM} =	using	Equation (Exhibit 13-6)		P _{FD} =	0	.538 using Ed	quation (Ex	hibit 13-7)
V ₁₂ =	pc/h				V ₁₂ =	3	939 pc/h		
V ₃ or V _{av34}	pc/h ((Equation 13	3-14 or 13-17)		V ₃ or V _{av34} 2023 pc/h (Equation 13-14 or 13-17)				
Is V_3 or $V_{av34} > 2,70$	0 pc/h? 🗌 Ye	s 🗌 No			Is V_3 or $V_{av34} > 2,700 \text{ pc/h}?$ Yes Vo				
Is V ₃ or V _{av34} > 1.5 *	V ₁₂ /2 Ye	s 🗌 No			Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No				
If Yes,V _{12a} =	pc/h (13_19	(Equation 13	3-16, 13-18, or		If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-10)				
Capacity Che	cks	/			Canacity Checks				
	Actual		Capacity	LOS F?		Actual	C	apacity	LOS F
					V _F	5962	Exhibit 13	-8 7200	No
Vro		Exhibit 13-8			$V_{\Gamma O} = V_{\Gamma}$	· V _D 4381	Exhibit 13	-8 7200	No
FO						1581	Exhibit 13-	10 2100	No
Elow Entering	n Merae Ir	fluence A	Area		I ⊼ Flow Ent	erina Dive	rae Influei	nce Area	
	Actual	Max	Desirable	Violation?		Actual	Max Desira	able	Violation
V _{R12}		Exhibit 13-8			V ₁₂	3939	Exhibit 13-8	4400:All	No
Level of Serv	ice Deterr	nination	(if not F)		Level of	Service De	terminatio	on (if not	: F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				D	9 _R = 4.252 + (0.0086 V ₁₂ - 0).009 L _D	•	
D _R = (pc/mi/ln)					D _R = 36.3 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = E (Exhibit 13-2)				
Speed Determination					Speed D	eterminati	on		
M _s = (Exibit 13-11)				D _s = 0.4	40 (Exhibit 13	-12)			
S _R = mph (Exh	ibit 13-11)				S _R = 57.	7 mph (Exhibit	13-12)		
$S_0 = mph (Exh$, ibit 13-11)				S ₀ = 72.	8 mph (Exhibit	13-12)		
S = mph (Exh	ibit 13-13)				S = 62.	0 mph (Exhibit	13-13)		
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2040 Build 1 Freeway HCS Operational Analysis

	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	Direction of Travel I-95 NB Seg 10-Bet Off & n		
Analysis Time Period	PM	Analysis Year	2040 Build 1			
Project Description SW 10t	h Street SIMR					
✓ Oper.(LOS))		Des.(N)	Pla	nning Data	
Flow Inputs						
Volume, V AADT	4140	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3		
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi		
Calculate Flow Adjustr	ments					
f _p	1.00		E _R	1.2		
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width		ft			mah	
Rt-Side Lat. Clearance	2	π	l _{LW}		mph	
Total Ramp Density TRD	5	ramps/mi	^I LC TRD Adjustment		mph	
FES (measured)	70.0	mnh		70.0	mph	
Base free-flow Speed, BFFS	70.0	mph	110	70.0	прп	
I OS and Performance	Moasuros		Design (N)			
$\frac{\text{Operational (LOS)}}{v_p} = (V \text{ or DDHV}) / (PHF x N)$ S D = v_p / S LOS	x f _{HV} x f _p) 1474 69.1 21.3 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x S)$ $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Infor	mation			Site Infor	mation					
Analyst			Fre	eeway/Dir of Tr	avel	I-95 N	IB			
Agency or Company	AEC	ОМ	Ju	nction		Seg 1	1-On Ramp 10	th St EB & W	В	
Date Performed			Ju	risdiction						
Analysis Time Period	PM		An	alysis Year		2040	Build 1			
Project Description	SW TUUT Suree	I SINK								
mputs		Freeway Nur	ber of Lanes N	2						
Upstream Adj Ramp		Pamp Numbe	or of Lanes, N	3 1					Downstrea Ramp	m Adj
☑Yes □Or	ı	Acceleration I	ane Length. L.	1200					Ramp	
	f	Deceleration	Lane Length L _D							
	I	Freeway Volu	ime, V _F	4140					IMNO NO	Off
L _{up} = 2800	ft	Ramp Volume	e, V _R	1320					L _{down} =	ft
V = 1440	/ch/h	Freeway Free	e-Flow Speed, S _{FF}	70.0					V., =	veh/h
v _u – 1440 (/en/n	Ramp Free-F	low Speed, S _{FR}	50.0					- D	
Conversion t	o pc/h Un	der 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	4140	0.95	Level	3	0	().985	1.00	44	.23
Ramp	1320	0.92	Level	2	0	().990	1.00	14	49
UpStream	1440	0.92	Level	2	0	().990	1.00	15	681
DownStream										
Estimation of	F 1, /		Ectimot	ion	Div	erge Areas				
Estimation of V ₁₂					Estimat		01 v ₁₂			
	V ₁₂ = V _F	(P _{FM})					V ₁₂ = V _R	+ (V _F - V _R)P _{FD}	
L _{EQ} =	2002.41	l (Equation	13-6 or 13-7)		L _{EQ} =		(Ed	quation 13-	12 or 13-13	8)
P _{FM} =	0.611	using Equa	tion (Exhibit 13-6)		P _{FD} =		usi	ng Equatio	n (Exhibit 13-	7)
v ₁₂ =	2703	pc/h na/h (Fauati	op 12 14 or 12		V ₁₂ =		pc/	'n		
V ₃ or V _{av34}	1720	pc/n (⊏quau	011 13-14 01 13-		$V_3 \text{ or } V_{av34}$ pc/h (Equation 13-14 or 13-17))
Is V_3 or $V_{av34} > 2,70$	0 pc/h? 🗌 Ye	s 🗹 No			$ _{SV_3} \text{ or } V_{av34} > 2,700 \text{ pc/h}? Yes No$					
Is V_3 or $V_{av34} > 1.5$ '	* V ₁₂ /2 🗹 Ye	s 🗌 No			Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No					
If Yes,V _{12a} =	2703	pc/h (Equati	on 13-16, 13-		lf Yes,V _{12a} =	=	pc/ 13-1	n (Equation 9)	n 13-16, 13	-18, or
Capacity Che	cks	13-19)			Capacit	v Cł	necks			
	Actual	(Capacity	LOS F?	<u> </u>	,	Actual	Cap	pacity	LOS F?
					V _F			Exhibit 13-8	3	
VFO	5872	Exhibit 13-8		No	$V_{FO} = V_F$	- V _R		Exhibit 13-8	3	
• FO	0012				<u> </u>			Exhibit 13-	-	
								10		
Flow Entering	g Merge In	fluence A	A <i>rea</i> Desirable	Violation?	Flow En	iterii	ng Diverg	e Influen	ce Area	Violation?
Valo	4152	Exhibit 13-8		No	Via		Actual	wax Desi xhibit 13-8	lable	violation?
Level of Serv	ice Detern	nination (if not F)	110	l evel of	L F Sei	vice Dete	rminatio	n (if not	F)
$D_{\rm p} = 5.475 +$	0.00734 v = + 0	0.0078 V 0.	006271.			D_ =	4.252 + 0.00)86 V 0.	0091	/
$D_{\rm p} = 29.7 (\rm pc/mi/ln)$						D = (pc/mi/lp)				
IOS = D(Exhibit)	13-2)				-R (P	- - xhib	it 13-2)			
Speed Detern	nination				Speed [Dete	rmination			
$M_{0} = 0.440 (Evil$	hit 13_11)				$D_c = (Exhibit 13-12)$					
$S_{\rm S} = 0.449 (EX)$		$S_{p} = mph (Exhibit 13-12)$								
$S_R = 65.6 \text{ mph}$	(Exhibit 12-11)				S_R mph (Exhibit 13-12)					
S = 59.6 mph	(Exhibit 13-13)				S = m	ph (F)	(hibit 13-13)			
	(I	r''' \ ' '				

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	l-95 NB Seg 12-i	Bet On Ramps
Analysis Time Period	PM		Analysis Year	2040 Bu	iild 1
Project Description SW 10th	h Street SIMR				uning Data
Elow Inputs			Des.(N)	Pla	anning Data
	5460	vob/b	Dook Hour Easter, DHE	0.05	
AADT	5460	veh/day	%Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustr	nents				
f _p	1.00		E _R	1.2	
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	3	
Lane Width		ft			and b
Rt-Side Lat. Clearance	2	Ħ	T _{LW}		mpn
Total Ramp Density TRD	3	ramps/mi	^I LC TRD Adjustment		mph
FES (measured)	70.0	mnh		70.0	mph
Base free-flow Speed, BFFS	10.0	mph		70.0	mpn
LOS and Performance	Measures	-	Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N) S D = v _p / S LOS	x f _{HV} x f _p) 1945 63.6 30.6 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x S)$ $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		F	REEWAY	WEAV	ING WOR	RKSHEE	Г		
General	Informatio	on			Site Info	rmation			
Analyst Agency/Con Date Perforr Analysis Tim	Analyst Agency/Company AECOM Date Performed Analysis Time Period PM				Freeway/Dir of Travel I-95 NB Weaving Segment Location Seg 13-Bet On & Off to Exp Analysis Year 2040 Build 1				Off to Exp
Project Desc	cription SW 10th	n Street SIMR			-				
Inputs					1				
Weaving configurationTwo-SidedWeaving number of lanes, N4Weaving segment length, Ls4600ftFreeway free-flow speed, FFS70 mph					Segment type Freeway minimum speed, S _{MIN} Freeway maximum capacity, C _{IFL} Terrain type				Freeway 15 2400 Level
Convers	sions to po	/h Unde	r Base Co	ondition	S		-	1	-
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)
V _{FF}	4440	0.95	3	0	1.5	1.2	0.985	1.00	4744
V _{RF}	1210	0.92	2	0	1.5	1.2	0.990	1.00	1328
V _{FR}	1020	0.92	2	0	1.5	1.2	0.990	1.00	1120
V _{RR}	260	0.92	2	0	1.5	1.2	0.990	1.00	285
V _{NW}	7192		-					V =	7477
V _w	285								
VR	0.038								
Configu	ration Cha	racterist	ics		•				
Minimum m	aneuver lanes, N	N _{WL}		0 lc	Minimum we	aving lane cl	nanges, LC _{MIN}		855 lc/h
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC _w				1481 lc/h
Minimum RI	lane changes,	LC _{RF}		0 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		3293 lc/h
Minimum FF	R lane changes,	LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{ALI}	_		4774 lc/h
Minimum RI	R lane changes,	LC_{RR}		3 lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		2316
Weaving	g Segment	Speed,	Density, I	_evel of	Service,	and Cap	oacity		
Weaving segment flow rate, v7381Weaving segment capacity, cw9013			7381 veh/h 9013 veh/h	Weaving inte Weaving seg	ensity factor, gment speed	W S		0.233 55.0 mph	
Weaving segment v/c ratio 0.819					Average weaving speed, S_w			59.6 mph	
Weaving segment density, D 34.0 pc/mi/ln			Average non-weaving speed, $S_{_{NW}}$				54.9 mph		
Level of Service, LUS D					Maximum weaving length, L _{MAX} 6081 ft				
Notes a. Weaving so Chapter 13, " b. For volume	egments longer th Freeway Merge a ss that exceed the	nan the calcula nd Diverge Se weaving segr	ted maximum le gments". nent capacity, tl	ength should l ne level of sei	be treated as is vice is "F".	olated merge	and diverge ar	eas using the	procedures of

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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 NB Seg 14-North of Hillsboro		
Analysis Time Period	PM h Street SIMR		Analysis Year	2040 BU		
Oper (LOS)	n Street Shink		Des (N)	Pla	nning Data	
Flow Inputs						
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	5650	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain:	0.95 4 0 Level		
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi		
Calculate Flow Adjustr	nents					
f _p	1.00		E _R	1.2		
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.980		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N : S D = v _p / S LOS	x f _{HV} x f _p) 1517 68.8 22.0 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company AECOM Date Performed Analysis Time Period AM			Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 1-Bet Hillsboro & Palmetto		
Analysis Time Period	AM		Analysis Year	2040 Bu	11 a 1	
			Des (N)	Pla	nning Data	
Flow Inputs	,		200.(11)			
Volume, V AADT	4870	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3		
Peak-Hr Prop. of AAD1, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade % Length Up/Down %	0 Level mi		
Calculate Flow Adjustr	nents					
f _ρ Ε _Τ	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1301 69.9 18.6 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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		F	REEWAY	WEAV	ING WOF	RKSHEE	Г				
General	Informatio	on			Site Info	rmation					
Analyst Agency/Con Date Perforr Analysis Tin	Analyst Agency/Company AECOM Date Performed Analysis Time Period AM					Freeway/Dir of TravelI95/SBWeaving Segment LocationSeg 2-Bet On from Exp & OffAnalysis Year2040 Build 1					
Project Desc	cription SW 10th	n Street SIMR			-						
Inputs					1						
Weaving configurationTwo-SidedWeaving number of lanes, N4Weaving segment length, Ls5200ftFreeway free-flow speed, FFS70 mph					Segment typ Freeway min Freeway ma: Terrain type		Freeway 15 2400 Level				
Convers	sions to po	/h Undei	r Base Co	ondition	s		1	1	-		
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)		
V _{FF}	3585	0.95	3	0	1.5	1.2	0.985	1.00	3830		
V _{RF}	1265	0.92	2	0	1.5	1.2	0.990	1.00	1389		
V _{FR}	1285	0.92	2	0	1.5	1.2	0.990	1.00	1411		
V _{RR}	145	0.92	2	0	1.5	1.2	0.990	1.00	159		
V _{NW}	6630							V =	6789		
V _w	159							-			
VR	0.023										
Configu	ration Cha	racterist	ics		•						
Minimum m	aneuver lanes, N	N _{WL}		0 lc	Minimum we	I	477 lc/h				
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC_w				1145 lc/h		
Minimum R	F lane changes,	LC _{RF}		0 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		3167 lc/h		
Minimum Ff	R lane changes,	LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{ALI}	L		4312 lc/h		
Minimum R	R lane changes,	LC _{RR}		3 lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		2413		
Weavin	g Segment	Speed,	Density, I	_evel of	Service,	and Cap	oacity				
Weaving segment flow rate, v6704 veh/hWeaving segment capacity, c9233 veh/h			Weaving intensity factor, W Weaving segment speed, S				0.195 58.5 mph				
Weaving segment v/c ratio 0.726				0.726	Average weaving speed, S_w				61.0 mph		
Weaving segment density, D 29.0 pc/mi/ln				9.0 pc/mi/ln	Average non-weaving speed, S_{NW}				58.4 mph		
Level of Sei	VICE, LUS			D	Maximum weaving length, L _{MAX} 5944 ft						
Notes a. Weaving s Chapter 13, " b. For volume	egments longer th Freeway Merge a es that exceed the	an the calcula nd Diverge Se weaving segn	ted maximum le gments". nent capacity, th	ength should l	be treated as is rvice is "F".	solated merge	and diverge ar	eas using the	procedures of		

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 3-Be	et Off & On Ramp
Analysis Time Period	AM		Analysis Year	2040 Bu	ild 1
	I SITEEL SIMR			- Dla	nning Data
			Jes.(N)		
Volume, V AADT	4850	veh/h veh/dav	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustn	nents				
f _p E _T	1.00 1.5		E _R f _{uv} = 1/[1+P _T (E _T - 1) + P _P (E _P - 1)]	1.2 0.985	
 Speed Inputs			Calc Speed Adi and FFS	3	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BEES	3 70.0	ft ft ramps/mi mph mob	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N > S D = v _p / S LOS	c f _{HV} x f _p) 1727 66.8 25.9 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x S)$ D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		RAMF	'S AND RAM	P JUNCTI	ONS WOR	RKSHEET			
General Infor	mation			Site Infor	mation				
Analyst Agency or Company	AEC	OM	Fr Ju	eeway/Dir of Tr inction	avel I- S	-95 SB Seg 4-Diverge to	SW 10th St		
Date Performed	ΔM		Ju Δr	irisdiction nalvsis Year	2	040 Build 1			
Project Description	SW 10th Stree	et SIMR		1019515 1 Cal	2				
Inputs									
Linotroom Adi D		Freeway Nur	nber of Lanes, N	3				Downotr	om Adi
Opsilean Auj K	amp	Ramp Numb	er of Lanes, N	1				Ramp	ani Auj
Yes	On	Acceleration	Lane Length, L						🔽 On
V No	Off	Deceleration	Lane Length L _D	200					
		Freeway Volu	ume, V _F	4850					ΟΠ
L _{up} = ff		Ramp Volum	e, V _R	1420				L _{down} =	1200 ft
V	h/h	Freeway Free	e-Flow Speed, S _{FF}	70.0				V., =	1640 veh
v _u – ve		Ramp Free-F	low Speed, S _{FR}	45.0				.0	
Conversion to	o pc/h Un	der Base	Conditions						
(pc/h)	V () (ab/br)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PH	F x f _{HV} x f _n
Freeway	4850	0.95	l evel	3	0	0.985	1 00	F	182
Ramp	1420	0.92	Level	2	0	0.990	1.00		559
UpStream									
DownStream	1640	0.92	Level	2	0	0.990	1.00	1	800
Fatimatian af		Merge Areas			F atimati		Diverge Areas		
Estimation of	v ₁₂				Estimatio	on or v ₁₂			
	V ₁₂ = V _F	(P _{FM})				V ₁₂	= V _R + (V _F - '	V _R)P _{FD}	
L _{EQ} =	(Equa	ation 13-6 oi	r 13-7)		L _{EQ} =		(Equation 13	-12 or 13-1	3)
P _{FM} =	using	Equation (Exhibit 13-6)		P _{FD} =	C	.559 using E	quation (Ex	hibit 13-7)
V ₁₂ =	pc/h				$V_{12} =$	3	583 pc/h		
v_3 or v_{av34}	pc/n (no/h2 □) (3-14 or 13-17)		$v_3 \text{ or } v_{av34}$ 1599 pc/n (Equation 13-14 or 13-17) Is V _a or V _{av34} 2.700 pc/h? Ves V No				
$15V_3 01V_{av34} > 2,70$					Is V_a or $V_{av34} > 2,700$ pc/// Yes V NO				
$15 v_3 01 v_{av34} > 1.5$	0 ₁₂ /2 mre	S LINO	3-16, 13-18, or		Is v_3 or $v_{av34} > 1.5 V_{12}/2$ Yes V No pc/h (Equation 13-16, 13-18, or 13-				
If Yes,V _{12a} =	13-19)	,,		$ fYes,V_{12a} = 19$				
Capacity Che	cks	-		5	Capacity	Checks			
	Actual	(Capacity	LOS F?		Actua	(Capacity	LOS F
					V _F	5182	Exhibit 13	3-8 7200	No
V _{FO}		Exhibit 13-8			$V_{FO} = V_{F}$	- V _R 3623	Exhibit 13	3-8 7200	No
					V _R	1559	Exhibit 13	-10 2100	No
Flow Entering	n Merge Ir	nfluence A	Area		Flow Ent	tering Dive	erge Influe	nce Area	1
N/	Actual	Max	Desirable	Violation?		Actual	Max Desir	able	Violation
V _{R12}	iaa Datawa	Exhibit 13-8	(: f = a f F)		V ₁₂	3583	Exhibit 13-8	4400:All	
$\frac{1}{2} = 5.475 \pm 0.01$					Level of	Service $Determine Determine Dete$		<u>on (it noi</u>	(F)
$D_R = 5.475 \pm 0.00734 V_R \pm 0.0078 V_{12} = 0.00027 L_A$				$D_{R} = 4.252 + 0.0086 V_{12} - 0.009 L_{D}$					
$D_R = (pc/m/m)$	$\sigma_{\rm R}$ (point, in)				$U_{\rm R} = 33.3 (\text{pc/mi/ln})$				
Speed Determination					LUS = D(EXHIDIT 13-2)	<u></u>		
Speed Detern	Speed Determination				D = 0.4		2 12)		
M _S = (Exibit 13	3-11)				D _s = 0.438 (Exhibit 13-12)				
ວ _R = mph (Exh	ibit 13-11)				$S_{R}^{-} = 5/.$		13-12)		
₀ = mph (ヒxh S = mph (ヒvh	ibit 13-11)				S = 62	o mpn (⊏xnin) 0 mph (⊑vhihi	+ 13-12)		
	of Eloride All 5				02. UDCCCCTM		13-13)	Conorstad	E/26/2040 42
ingrit ⊌ ∠0 to University	UI FIUIIUA, All F	vights reserved	1		HCS2010''''	version 6.90		Generated:	JIZUIZU19 12

2040 Build 1 Freeway HCS Operational Analysis

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 5-Be	et Off & On Ramps
Analysis Time Period	AM Street SIMP		Analysis Year	2040 Bul	10 1
	Street Shink	r	Des (N)	Pla	nning Data
Flow Inputs					
Volume, V AADT	3430	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustm	nents				
f _ρ Ε _Τ	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance I	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p) 1222 70.0 17.5 B	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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RAMPS AND RAMP JUNCTIONS WORKSHEET											
Genera	l Infor	mation			Site Infor	mation					
Analyst				Fi	reeway/Dir of Tra	avel I-95 SB					
Agency or (Company	AEC	ОМ	Ju	unction		Seg 6	-Merge from	Hillsboro E&W		
Date Perfor	rmed			Ju	urisdiction		Ū	·			
Analysis Ti	me Period	AM		A	nalysis Year		2040	Build 1			
Project Des	scription	SW 10th Stree	t SIMR								
Inputs											
l Instream /	Adi Ramo		Freeway Num	ber of Lanes, N	3					Downstree	m Adi
opstream <i>P</i>	nuj namp		Ramp Numbe	r of Lanes. N	1					Ramp	
✓ Yes	🗌 On			ane Length	1100						
					1100					∐ Yes	□ On
🗌 No	✓ Off	:	Deceleration L	Lane Length L _D						✓ No	Off
			Freeway Volu	me, V _F	3430						<i>.</i>
L _{up} =	1200	ft	Ramp Volume	e, V _R	1640					L _{down} =	π
			Freeway Free	-Flow Speed, S _{FF}	70.0					V _	la /la
V _u =	1420 v	reh/h	Ramp Free-Fl	ow Speed, S ₋₅	50.0					v _D –	ven/n
Conver	rsion to	pc/h Un	der Base (Conditions							
(pc/	/h)	V	PHF	Terrain	%Truck	%Rv		f _{LN/}	f	v = V/PHF	x f _{uv} x f _n
(p.s,	,,	(Veh/hr)			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,,,,,,	+		β		пу р
Freeway		3430	0.95	Level	3	0).985	1.00	3	065
Ramp		1640	0.92	Level	2	0	().990	1.00	18	300
UpStream		1420	0.92	Level	2	0	(0.990	1.00	1:	559
DownStrea	am										
	41 a m a f		Merge Areas			Diverge Areas					
Estima	tion of	v ₁₂				Estimat	ion	of V ₁₂			
		V ₁₂ = V _F	(P _{FM})					V = V	V_ + (V V_	\P	
L _{EO} =		1870.9 ²	(Equation	13-6 or 13-7)		_		* 12		/' FD	
		0.566	using Equat	ion (Exhibit 13-6)	EQ -		(12 OF 13-1	5) _`
V =		2074	nc/h)	P _{FD} =		ι	using Equatio	on (Exhibit 13	-/)
* 12		2014	pc/n na/h (Equativ	on 12 14 or 12		V ₁₂ =		F	oc/h		
V_3 or V_{av34}		1391		011 13-14 01 13-	-	$V_3^{}$ or $V_{av34}^{}$			pc/h (Equation 1	3-14 or 13-17	7)
Is V ₂ or V ₂	> 2.70	0 pc/h? 🗌 Ye	s 🗸 No			Is V ₃ or V _{av}	₃₄ > 2,	700 pc/h?	Yes No		
ls V or V	> 15 *	V/2 $V/2$				Is V ₂ or V ₂	₃₁ > 1.	5 * V ₁₂ /2	Yes No		
13 v ₃ 01 v _a	w34 - 1.0	v ₁₂ /∠ ≥ re	S [] INO			$f_{Vac} V = pc/h$ (Equation 13-16, 13-18, or					
If Yes,V _{12a}	=	2094 18 or	pc/n (Equation 13_10)	on 13-16, 13-		If Yes,V _{12a} =	-	13	3-19)	, -	-, -
Canaci	tv Che	rks	10 10)			Canacit	v Cł	nerks			
Gupuon	ty ente	Actual		`anacity	1.0S E2						LOS E2
		Actual	Ť	apacity	LUGT	V		Actual	Evhibit 13 9		
						V _F				5	
V _F	0	5465	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V _R		Exhibit 13-8	8	
						V _R			Exhibit 13	-	
Flow F	nterinc	n Merge In	fluence A	rea		Flow En	teri	na Diver	rae Influen		
		Actual	Max	Desirable	Violation?			Actual	Max Desi	irable	Violation?
VD	10	3894	Exhibit 13-8	4600:All	No	V12			Exhibit 13-8		
	of Serv	ice Deterr	nination (if not F)		l evel of	- Sei	rvice De	terminatio	n (if not	F)
	- 5 475 +			06271			<u> </u>	4 252 ± 0			·/
P = -28.1 (no/millin)							∽R -	7.202 T U			
$D_R = 2$	28.1 (pc/m	i/in)				D _R = (p	oc/mi/	'In)			
LOS = D (Exhibit 13-2)						LOS = (E	Exhib	it 13-2)			
Speed	Detern	nination				Speed L	Dete	rminatic	on		
M _s = c).403 (Exik	oit 13-11)				D _s = (E	xhibit	13-12)			
S _□ = 5	58.7 mph (Exhibit 13-11)				S _R = m	ph (Ex	(hibit 13-12)			
S_= 6	6 1 mph (Exhibit 13_11)				S₀= m	ph (Ex	(hibit 13-12)			
S = 6	50. i inpii (50. 7 mnh (Exhibit 13-11)				S = m	. 、/ nh (⊏v	(hihit 13_13)			
<u>۲</u> - ۲						۳- m		(10-13)			

Appendix K

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 7-B	et On Ramps
Analysis Time Period	AM h Street SIMP		Analysis Year	2040 Bu	110 T
Oper (LOS)			Des (N)	Pla	anning Data
Flow Inputs		· · · ·	500.(17)		
Volume, V AADT	5070	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustr	nents				
f _p E+	1.00 1.5		E_{R} f ₁ y = 1/(1+P_{T}(E_{T} - 1) + P_{R}(E_{R} - 1))	1.2 0.985	
Speed Inputs			Calc Speed Adi and FES		
Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N : S D = v _p / S LOS	x f _{HV} x f _p) 1806 65.7 27.5 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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Job: SW 10th Street SIMR Analyst: AECOM

Location:	Seg 8: I-	g 8: I-95 Southbound On-Ramp from SW 10th Stree								
Analysis Period:	AM Peak	Hour								
Analysis Year:	2040 Bui	ld 1								
5 070			6 620							
			P 0,020							
1,550										
	PHF =	0.95								
	v _{fr} =	6,620	vph							
	v _r =	1,550	vph							
	v _f =	5,070								
Upstream Freeway	Tr % =	3%								
Ramp	Tr % =	2%								
Downstream Freeway	Tr % =	3%								
Freeway	f _{HV} =	1/(1+P	_r (E _⊤ -1)+P _R (E _R -	·1)) =	0.985					
Ramp	f _{HV} =	1/(1+P	r(E _T -1)+P _R (E _R -	-1)) =	0.9901					
flat terrain	Ε _τ =	1.5								
	RV % =	0								
Driver Population adj.	f _P =	1.000								
	V _{fr} =	=v _{fr} /(PF	$(f_{HV})(f_{P}) =$	7,073	pc/h					
	V _r =	=v _r /(PH	$IF)(f_{HV})(f_{P}) =$	1,648	pc/h					
	V _f =	=v _f /(PH	IF)(f _{HV})(f _P) =	5,417	pc/h					
No. lanes upstream of ramp	N =	3								

<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	7,073	0.74	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,417	0.75	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,648	0.78	No

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	Analyst Agency or Company AECOM Date Performed Analysis Time Period AM			I-95 SB Seg 9-Be	et 10th & Exit to Exp
Project Description SW 10th	Street SIMR			2040 Du	
✓ Oper.(LOS)			Des.(N)	Pla	nning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	6620	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain:	0.95 3 0 Level	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi	
Calculate Flow Adjustm	nents				
f _p E r	1.00 1.5		E _R f _{1.11} = 1/[1+P _T (E _T - 1) + P _D (E _D - 1)]	1.2 0.985	
Sneed Innuts			Calc Speed Adi and FES		
Lane Width		ft		,	
Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance I	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	f _{HV} x f _p) 1768 66.3 26.7 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design hor	S - Speed D - Density FFS - Free-flow BFFS - Base fre ur volume	speed e-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Info	rmation			Site Infor	mation					
Analyst			Fre	eeway/Dir of Tr	avel I-95 SB					
Agency or Company	y AEC	ОМ	Ju	nction		Seg 10	- Diverge to	Express		
Date Performed			Ju	risdiction		•	-			
Analysis Time Perio	d AM		An	alysis Year		2040 B	uild 1			
Project Description	SW 10th Stree	t SIMR								
Inputs	Inputs									
Upstream Adi F	Ramp	Freeway Num	nber of Lanes, N	4					Downstrea	m Adi
Ramp Number of Lanes, N 1				1					Ramp	,
Yes 🛛	Yes On Acceleration Lane Length, L									
		Deceleration	l ane l ength l	300						
	Off	Eroowov Volu		6600					🗹 No	Off
	500 ft		inie, v _F	0020					I. =	ft
L Lup 4	500 IL	Ramp Volume	e, V _R	950					down	
V = 1	550 veh/h	Freeway Free	e-Flow Speed, S _{FF}	70.0					V _D =	veh/h
		Ramp Free-F	low Speed, S _{FR}	45.0						
Conversion	to pc/h Une	der Base	Conditions						н. -	
(nc/h)	V	DHE	Terrain	%Truck	%Pv		f	f	v = V/PHF	yf yf
(pc/ll)	(Veh/hr)		Terrain	70 TTUCK	/01.1.V		'HV	'p	• •/1 111	∧ ' _{HV} ∧ 'p
Freeway	6620	0.95	Level	3	0	0.	985	1.00	70	73
Ramp	950	0.92	Level	2	0	0.	990	1.00	104	43
UpStream	1550	0.92	Level	2	0	0.	990	1.00	17	02
DownStream										
		Merge Areas			Diverge Areas					
Estimation o	ot v ₁₂				Estimat	ion o	of v ₁₂			
	V ₁₂ = V _F	(P _{FM})					V ₁₂ =	V _R + (V _F - \	/ _R)P _{FD}	
L _{E0} =	(Equa	ition 13-6 or	13-7)		L _{E0} =		·= (E	Equation 13-	12 or 13-13)
P=	usina	Equation (Exhibit 13-6)				0,4	136. usina Fr	, nuation (Exhi	nit 13-7)
	nc/h						26	70 no/h		
12	pc/h	Faultion 12	14 ar 10 17)		$^{\circ}12$		50	12 pu/ii 00 ma/la (Em		
$v_3 \text{ or } v_{av34}$	рслі (-14 01 13-17)		v ₃ 01 v _{av34}		11	00 pc/n (Eq	uation 13-14	• of 13-17)
IS V_3 or $V_{av34} > 2,7$		s ∐No			IS V ₃ OF V _{av}	₃₄ > 2,7		Yes 🗹 No)	
Is V_3 or $V_{av34} > 1.5$	* V ₁₂ /2 Ye	s 🗌 No			Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes V No					
lf Yes,V _{12a} =	pc/h (Equation 13	-16, 13-18, or		If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-					
Canacity Ch	13-19)				Capacity Chocks					
	Actual		Sanaoity .							
	Actual		Japacity	LUGF?	V		Actual	Cubibit 40		
					V _F		7073	EXHIBIT 13	-0 9000	NO
V _{FO}		Exhibit 13-8			$V_{FO} = V_{F}$	- V _R	6030	Exhibit 13	-8 9600	No
					V _R		1043	Exhibit 13-	10 2100	No
Flow Enterin	g Merge In	fluence A	Area		Flow En	nterin	g Diver	ge Influe	nce Area	
	Actual	Max	Desirable	Violation?			Actual	Max Desira	able	Violation?
V _{P12}		Exhibit 13-8			V ₁₂		3672	Exhibit 13-8	4400:All	No
l evel of Serv	ice Detern	nination (if not F)		l evel of	fSer	vice De	terminatio	n (if not l	=)
$D = 5.475 \pm 0.00734 + 0.0078 V = 0.00627 I$										
$D_{\rm R} = (1 - (1 - (1 - (1 - (1 - (1 - (1 - (1$					$D_{\rm R} = 4.252 + 0.0086 \rm V_{12} - 0.009 \rm L_{\rm D}$					
$D_R = (pc/m/n)$						D _R = 36.3 (pc/mi/ln)				
LOS = (Exhibit		LOS = E (Exhibit 13-2)								
Speed Determination					Speed L	Deter	minatio	n		
M _s = (Exibit 1	(3-11)				D _s = 0.	392 (E	xhibit 13-	12)		
$S_{p} = mnh (Fx)$, hibit 13-11)				S _R = 59	9.0 mph	(Exhibit	13-12)		
S = mah(Ex)	hibit 12 11)				$S_0 = 74$	1.8 mnh	(Exhibit	, 13-12)		
S = mph (Ex)	hibit 13-11)				S = G	10 mnh		13_13)		
	the of Florida A" F	lighto Deserved				1.5 mpi		10-10)	Concreted	
yngni ⊜ ∠u iu Universi	ity of Florida, All R	agina reserved			HCS2010'''	··· versi	on 6.90		Generaleu. 5	"LUILUIS I.T

2040 Build 1 Freeway HCS Operational Analysis

	BASIC F	REEWAY SE	GMENTS WORKSHEET			
General Information			Site Information			
Analyst Agency or Company AECOM Date Performed Analysis Time Period AM			Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 SB Seg 11-Bet Off Exp Off Samp 2040 Build 1		
Project Description SW 10	th Street SIMR					
✓ Oper.(LOS))		Des.(N)	Pla	anning Data	
Flow Inputs						
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5670	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi		
Calculate Flow Adjusti	ments					
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985		
Speed Inputs			Calc Speed Adj and FFS	6		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{⊥w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph	
LOS and Performance	Measures		Design (N)			
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1514 68.9 22.0 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design he	S - Speed D - Density FFS - Free-flow BFFS - Base fre	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11	

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	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	AECOM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	l-95 SB Seg 13-l 2040 Bu	Bet Off & On Ramps
Project Description SW 10t	h Street SIMR			2040 Du	
✓ Oper.(LOS))		Des.(N)	Pla	anning Data
Flow Inputs					Ŭ
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	4620	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi	
Oslavilata Elava Adimati			Up/Down %		
f _p	1.00		E _R	1.2	
Ε _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{∟w} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1645 67.7 24.3 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	-13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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		F	REEWA	WEAV	ING WOF	RKSHEE	Г		
General	Informatio	on			Site Info	rmation			
Analyst Agency/Com Date Perforr Analysis Tim	Analyst Agency/Company AECOM Date Performed Analysis Time Period AM				Freeway/Dir of Travel I-95 SB Weaving Segment Location Seg 14- Bet Sample & Copans Analysis Year 2040 Build 1				
Project Desc	cription SW 10th	n Street SIMF	2						
Inputs									
Weaving cor Weaving nu Weaving seg Freeway free	nfiguration mber of lanes, N gment length, L _s e-flow speed, FF	Segment typ Freeway min Freeway ma: Terrain type	e imum speed, ximum capac	, S _{MIN} ity, C _{IFL}		Freeway 15 2400 Leve			
Convers	sions to po	/h Unde	r Base Co	ondition	S		•		
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)
V _{FF}	3915	0.95	3	0	1.5	1.2	0.985	1.00	4183
V _{RF}	1970	0.92	2	0	1.5	1.2	0.990	1.00	2163
V _{FR}	705	0.92	2	0	1.5	1.2	0.990	1.00	774
V _{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V _{NW}	4183							V =	7120
V _w	2937								
VR	0.412								
Configu	ration Cha	racteris	tics						
Minimum ma	aneuver lanes, N	N _{WL}		2 lc	Minimum weaving lane changes, LC _{MIN}				lc/h
Interchange	density, ID			0.7 int/mi	Weaving lan	e changes, L	C _w		lc/h
Minimum RI	F lane changes,	LC _{RF}		1 lc/pc	Non-weaving	g lane change	es, LC _{NW}		lc/h
Minimum FF	R lane changes,	LC_{FR}		1 lc/pc	Total lane ch	nanges, LC _{ALI}	L		lc/h
Minimum RI	R lane changes,	LC _{RR}		lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		893
Weaving	g Segment	Speed,	Density, I	Level of	Service,	and Cap	oacity		
Weaving segment flow rate, v7029 veh/hWeaving segment capacity, c5732 veh/h				7029 veh/h 5732 veh/h	Weaving inte Weaving seg	ensity factor, gment speed,	W , S		mph
Weaving segment v/c ratio 1.22					Average weaving speed, S_w				mph
Weaving segment density, D pc/mi/ln				Average non-weaving speed, S_{NW}				mph	
Level of Ser	VICE, LUS			F	Maximum w	eaving length	i, L _{max}		6822 ft
Notes a. Weaving so Chapter 13, " b. For volume	egments longer th Freeway Merge a es that exceed the	nan the calcula nd Diverge Se weaving seg	ated maximum le egments". ment capacity, tl	ength should l ne level of ser	be treated as is rvice is "F".	solated merge	and diverge an	eas using the	procedures of

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BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed Analysis Time Period	AECOM PM		Highway/Direction of Travel From/To Jurisdiction Analysis Year	I-95 SB Seg 1-B 2040 Bu	et Hillsboro & Palmetto ild 1				
Project Description SW 10t	h Street SIMR			2010 20					
Oper.(LOS))		Des.(N)	Pla	anning Data				
Flow Inputs									
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	5150	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P _T %RVs, P _R General Terrain: Grade % Length	0.95 3 0 Level mi					
Calculate Flow Adjustr	monts		Up/Down %						
	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	1.2 0.985					
Speed Inputs			Calc Speed Adj and FFS	6					
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph				
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1376 69.6 19.8 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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		F	REEWAY	(WEAV	ING WOF	RKSHEE	Г			
General	Informatio	on			Site Info	rmation				
Analyst Agency/Con Date Perforr Analysis Tin	Analyst Agency/Company AECOM Date Performed Analysis Time Period PM					Freeway/Dir of Travel I95/SB Weaving Segment Location Seg 2-Bet On from Exp & Off Analysis Year 2040 Build 1				
Project Des	cription SW 10th	n Street SIMR			-					
Inputs					1					
Weaving configurationTwo-SidedWeaving number of lanes, N4Weaving segment length, Ls5200ftFreeway free-flow speed, FFS70 mph					Segment type Freeway minimum speed, S _{MIN} Freeway maximum capacity, C _{IFL} Terrain type				Freeway 15 2400 Level	
Convers	sions to po	/h Unde	r Base Co	ondition	s		1	1	1	
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF}	4010	0.95	3	0	1.5	1.2	0.985	1.00	4284	
V _{RF}	1460	0.92	2	0	1.5	1.2	0.990	1.00	1603	
V _{FR}	1140	0.92	2	0	1.5	1.2	0.990	1.00	1252	
V _{RR}	130	0.92	2	0	1.5	1.2	0.990	1.00	143	
V _{NW}	7139		-					V =	7282	
V _w	143							-	-	
VR	0.020									
Configu	ration Cha	racterist	ics		•					
Minimum m	aneuver lanes, N	N _{WL}		0 lc	Minimum weaving lane changes, LC _{MIN}				429 lc/h	
Interchange	density, ID			0.7 int/mi	Weaving lane changes, LC _w				1097 lc/h	
Minimum R	F lane changes,	LC _{RF}		0 lc/pc	Non-weaving	g lane chang	es, LC _{NW}		3281 lc/h	
Minimum Fl	R lane changes,	LC _{FR}		0 lc/pc	Total lane ch	nanges, LC _{ALI}	_		4378 lc/h	
Minimum R	R lane changes,	LC _{RR}		3 lc/pc	Non-weaving	g vehicle inde	ex, I _{NW}		2599	
Weaving	g Segment	Speed,	Density, I	Level of	Service,	and Cap	acity			
Weaving segment flow rate, v 7189 veh/h Weaving segment capacity, c 9245 veh/h				7189 veh/h 9245 veh/h	Weaving inte Weaving seg	ensity factor, gment speed	W S		0.197 58.2 mph	
Weaving segment v/c ratio 0.778					Average wea	aving speed,	S _w		60.9 mph	
Weaving segment density, D 31.3 pc/mi/ln					Average non-weaving speed, S_{NW}				58.2 mph	
Level of Service, LOS D					Maximum weaving length, L _{MAX} 5909 ft					
Notes										
a. Weaving s Chapter 13, " b. For volume	egments longer th Freeway Merge a es that exceed the	an the calcula nd Diverge Se weaving segr	ted maximum le gments". nent capacity, th	ength should l	be treated as is rvice is "F".	olated merge	and diverge ar	eas using the	procedures of	

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BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 3-B	et Off & On Ramp				
Analysis Time Period	PM		Analysis Year	2040 Bu	ild 1				
Project Description SW 10t	n Street SIMR				unarian Data				
Elow Inputs			Jes.(N)		inning Data				
	E 170	a se la lla		0.05					
AADT	5470	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3					
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi					
Calculate Flow Adjustr	nents								
f _p	1.00		E _R	1.2					
Ε _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985					
Speed Inputs			Calc Speed Adj and FFS	3					
Lane Width		ft			and b				
Rt-Side Lat. Clearance	2	Ħ			mpn				
Total Pamp Density TPD	3	ramps/mi	^I LC TRD Adjustment		mph				
FES (measured)	70.0	mnh		70.0	mph				
Base free-flow Speed, BFFS	70.0	mph	110	70.0	тірі				
LOS and Performance	Measures		Design (N)						
$\frac{\text{Operational (LOS)}}{v_p} = (V \text{ or DDHV}) / (PHF x N)$ S D = v_p / S LOS	x f _{HV} x f _p) 1948 63.5 30.7 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x N x S)$ $D = v_p / S$ Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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		RAMF	'S AND RAM	P JUNCTI	ONS WOR	RKSHEET				
General Infor	mation			Site Infor	mation					
Analyst Agency or Company	AEC	OM	Fr Ju	eeway/Dir of Tr inction	avel I- S	-95 SB Seg 4-Diverge to	SW 10th St			
Date Performed	PM		Ju Δr	irisdiction nalvsis Year	2	040 Build 1				
Project Description	SW 10th Stree	et SIMR		1019515 1 001	2					
Inputs										
Linstroom Adi D		Freeway Nur	nber of Lanes, N	3				Downstr	oom Adi	
Opsilean Auj K	amp	Ramp Numb	er of Lanes, N	1				Ramp	ani Auj	
Yes	On	Acceleration	Lane Length, L _A					Ves.	🗸 On	
✓ No	Off	Deceleration	Lane Length L _D	200						
	-	Freeway Volu	ume, V _F	5470						
L _{up} = fi		Ramp Volum	e, V _R	1500				L _{down} =	1200 ft	
Freeway Free-Flow Speed, S _{FF} 70.0								V. =	1720 veh	
v _u – v	511/11	Ramp Free-F	low Speed, S _{FR}	45.0					1120 1011	
Conversion to	o pc/h Un	der Base	Conditions							
(pc/h)	V () (ob/br)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PH	F x f _{HV} x f _p	
Freeway	5470	0.95	l evel	3	0	0.985	1 00		5844	
Ramp	1500	0.92	Level	2	0	0.990	1.00		1647	
UpStream										
DownStream	1720	0.92	Level	2	0	0.990	1.00		1888	
		Merge Areas				6	Diverge Areas			
Estimation of	v ₁₂				Estimatio	on of v_{12}				
	V ₁₂ = V _F	(P _{FM})				V ₁₂ :	= V _R + (V _F -)	V _R)P _{FD}		
L _{EQ} =	(Equa	ation 13-6 oi	r 13-7)		L _{EQ} =		(Equation 13	-12 or 13-1	3)	
P _{FM} =	using	Equation (Exhibit 13-6)		P _{FD} =	0	.538 using E	quation (Ex	hibit 13-7)	
V ₁₂ =	pc/h				V ₁₂ =	3	906 pc/h			
V ₃ or V _{av34}	pc/h ((Equation 13	3-14 or 13-17)		$V_3^{}$ or $V_{av34}^{}$	1	938 pc/h (Ec	uation 13-	14 or 13-17	
Is V_3 or $V_{av34} > 2,70$	0 pc/h? 🗌 Ye	es 🗌 No			Is V_3 or $V_{av34} > 2,700$ pc/h? Yes V No					
Is V_3 or $V_{av34} > 1.5$ *	V ₁₂ /2 □Ye	es 🗌 No	40 40 40		Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No					
lf Yes,V _{12a} =	pc/n (13-19	(Equation 13	3-16, 13-18, or		If Yes,V _{12a} = pc/h (Equation 13-16, 13-18, or 13- 19)					
Capacity Che	cks	/			Capacity Checks					
	Actual	(Capacity	LOS F?		Actua	(Capacity	LOS F	
					V _F	5844	Exhibit 13	3-8 7200	No	
V _{FO}		Exhibit 13-8			$V_{FO} = V_{F}$	- V _R 4197	Exhibit 13	3-8 7200	No	
					V _R	1647	Exhibit 13	-10 2100	No	
Flow Entering	Merge In	fluence A	Area		Flow Ent	tering Dive	rge Influe	nce Area	1	
	Actual	Max	Desirable	Violation?		Actual	Max Desir	able	Violation	
V _{R12}		Exhibit 13-8			V ₁₂	3906	Exhibit 13-8	4400:All	No	
Level of Serv	ice Deterr	mination	(if not F)		Level of	Service De	eterminati	on (if no	t F)	
D _R = 5.475 + 0.00734 v _R + 0.0078 V ₁₂ - 0.00627 L _A				D) _R = 4.252 + ().0086 V ₁₂ -	0.009 L _D			
D _R = (pc/mi/ln)				D _R = 36.0 (pc/mi/ln)					
LOS = (Exhibit [·]	13-2)				LOS = E (Exhibit 13-2)					
Speed Determination					Speed D	eterminati	on			
M _S = (Exibit 1:	3-11)				D _s = 0.4	46 (Exhibit 13	3-12)			
S _R = mph (Exh	ibit 13-11)				S _R = 57.	5 mph (Exhibit	13-12)			
S ₀ = mph (Exh	, ibit 13-11)				S ₀ = 73.	1 mph (Exhibit	: 13-12)			
S = mph (Exh	ibit 13-13)				S = 61.	9 mph (Exhibit	: 13-13)			
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2040 Build 1 Freeway HCS Operational Analysis

BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 5-B	et Off & On Ramps				
Analysis Time Period	PM		Analysis Year	2040 Bu	uld 1				
					nning Data				
)		Jes.(IN)		anning Data				
Volume, V AADT	3970	veh/h veh/dav	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3					
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi					
Calculate Flow Adjust	ments								
f _p E _T	1.00 1.5		E _R f _{LV/} = 1/[1+P _T (E _T - 1) + P _P (E _P - 1)]	1.2 0.985					
Speed Inputs			Calc Speed Adi and FFS	6					
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph				
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N S D = v _p / S LOS	x f _{HV} x f _p) 1414 69.5 20.4 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design h	S - Speed D - Density FFS - Free-flow BFFS - Base fre our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	.13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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RAMPS AND RAMP JUNCTIONS WORKSHEET											
Genera	I Infor	mation			Site Infor	mation					
Analyst				Fr	reeway/Dir of Tra	Fravel I-95 SB					
Agency or (Company	AEC	OM	Ju	unction		Seq 6	-Merge from	Hillsboro E&W		
Date Perfor	rmed			Ju	urisdiction		Ŭ	0			
Analysis Tir	me Period	PM		Ai	nalysis Year		2040	Build 1			
Project Des	scription	SW 10th Stree	t SIMR								
Inputs											
Linstroom A	\di Pamp		Freeway Num	ber of Lanes, N	3					Downstroa	m Adi
Opsilean P	nuj marrip		Ramp Numbe	r of Lanes. N	1					Ramp	
✓ Yes	🗌 On		Acceleration	ane Length	1100						
					1100					∐Yes	∐ On
🗌 No	✓ Off		Deceleration L	ane Length L _D						✓ No	Off
			Freeway Volu	me, V _F	3970						<i>c</i> ,
L _{up} =	1200	ft	Ramp Volume	Ramp Volume, V _R 1720						L _{down} =	π
L.			Freeway Free	-Flow Speed, S _{FF}	70.0					V _	la /la
V _u =	1500 v	/eh/h	Ramp Free-Fl	ow Speed. S	50.0					v _D -	ven/n
Conver	rsion to	pc/h Un	der Base (Conditions							
(pc/	/h)	V	PHF	Terrain	%Truck	%Rv	Τ	f _{LN/}	f	v = V/PHF	x f _{uv} x f _n
(po,	,	(Veh/hr)			, or indicit	/////		HV	-p		нутор
Freeway		3970	0.95	Level	3	0	().985	1.00	42	242
Ramp		1720	0.92	Level	2	0	(0.990	1.00	18	388
UpStream		1500	0.92	Level	2	0	().990	1.00	16	647
DownStrea	am										
		•	Merge Areas				-		liverge Areas		
Estimat	tion of	v ₁₂									
		V ₁₂ = V _F	(P _{FM})					V = '	V + (V - V))P	
L _{E0} =		2013.22	2 (Equation	13-6 or 13-7)		_		v 12 ⁻		/ FD 40 am 40 44	
P =		0 557	using Equat	ion (Exhibit 13-6))	EQ -		(Equation 13-	12 OF 13-13	5)
		2363	nc/h		/	P _{FD} =		ı	using Equatio	n (Exhibit 13	-/)
* 12		1970	pu/n na/h (Equativ	on 12 14 or 12		V ₁₂ =		I	oc/h		
V_3 or V_{av34}		1079	pc/ii (Equalio	011 13-14 01 13-	•	$V_3^{}$ or $V_{av34}^{}$			pc/h (Equation 1	3-14 or 13-17	7)
Is V ₂ or V.	> 2.70	0 pc/h? 🗍 🗸 e	s 🗸 No			Is V ₃ or V _{av34} > 2,700 pc/h? Yes No					
ls V or V	> 15*					Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No					
13 v 3 01 v av	v34 × 1.0	12 ^{/2} ™ 1€	SNU	n 12 16 12		pc/h (Equation 13-16, 13-18, or					
If Yes,V _{12a}	=	2424 18 or	pc/n (Equaii 13₋19)	0113-10, 13-		if Yes, v _{12a} =	-	1	3-19) ່	,	,
Capaci	tv Che	cks	10 10)			Capacit	v Cł	necks			
	. ,	Actual	C	apacity	LOS F?	Actual Canacity LOS F2					LOS F?
			İ			V_			Exhibit 13-	3	
L							V				
V _F	0	6130	Exhibit 13-8		No	V _{FO} – V _F	- v _R		Exhibit 13-0	<u>></u>	
						V _R			Exhibit 13-	•	
Flow E	nterinc	n Merae In	fluence A	rea		Flow En	teri	na Dive	rae Influen	ce Area	
		Actual	Max	Desirable	Violation?		T	Actual	Max Desi	rable	Violation?
V _P	12	4312	Exhibit 13-8	4600:All	No	V ₁₂			Exhibit 13-8		
Level o	f Serv	ice Detern	nination (if not F)		Level of	f Sei	vice De	terminatio	n (if not	F)
 D :	= 5.475 +	$0.00734 v_{p} + ($	0.0078 V 0.0	006271.			$D_{n} =$	4 252 + 0	0086 V 0	0091	/
	21 2 (no/	i/lp)	12 0.0	A		h - 7	- R	<u>_0</u> _ · 0	12 0		
$D_R = 3$	51.5 (pc/m	1/11) / • • •				P _R = (F		nn)			
LOS = L) (Exhibit	13-2)				LOS = (E	zhib	it 13-2)			
Speed I	Detern	nination				Speed L	Dete	rminatio	on		
M _S = 0).502 (Exit	oit 13-11)				D _s = (Exhibit 13-12)					
S _P = 5	5.9 mph (Exhibit 13-11)				S _R = mph (Exhibit 13-12)					
S_= 6	353 mnh (Exhibit 13-11				S₀= m	ph (Ex	(hibit 13-12)			
S = 5	58.4 mnh (Exhibit 13-13				S= m	nh (⊑v	, (hibit 13-13)			
r	pn (_/				r "	r (∟ /				

Appendix K

BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 7-B	et On Ramps				
Analysis Time Period	PM h Street SIMP		Analysis Year	2040 Bu	iild 1				
	IT SLIEEL SIMIK			Pla	anning Data				
Flow Inputs			JC3.(IV)						
Volume, V AADT	5690	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3					
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi					
Calculate Flow Adjustr	nents								
f _p E _T	1.00 1.5		E _R f _{HV} = 1/[1+P _T (E _T - 1) + P _P (E _P - 1)]	1.2 0.985					
 Speed Inputs			Calc Speed Adi and FFS	6					
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	3 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph				
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N : S D = v _p / S LOS	x f _{HV} x f _p) 2026 62.1 32.6 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base free our volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11				

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Job: SW 10th Street SIMR Analyst: AECOM

Location:	Seg 8: I-	eg 8: I-95 Southbound On-Ramp from SW 10th Street						
Analysis Period:	PM Peak	Hour						
Analysis Year:	2040 Bui	ld 1						
5 690			7 250			`		
			P 1,200					
						>		
1,560								
	PHF =	0.95						
	v _{fr} =	7,250	vph					
	v _r =	1,560	vph					
	v _f =	5,690						
Upstream Freeway	Tr % =	3%						
Ramp	Tr % =	2%						
Downstream Freeway	Tr % =	3%						
Freeway	f _{HV} =	1/(1+P	_r (E _r -1)+P _R (E _r -	·1)) =	0.985			
Ramp	f _{HV} =	1/(1+P	_r (E _⊤ -1)+P _R (E _R -	-1)) =	0.9901			
flat terrain	Ε _τ =	1.5						
	RV % =	0						
Driver Population adj.	f _P =	1.000						
	V _{fr} =	=v _{fr} /(PF	HF)(f _{H∨})(f _P) =	7,746	pc/h			
	V _r =	=v _r /(PH	$ F(f_{HV})(f_{P}) =$	1,659	pc/h			
	V _f =	=v _f /(PH	IF)(f _{HV})(f _P) =	6.079	pc/h			
No. lanes upstream of ramp	N =	3	// /					

<u>No. Ln</u>	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	7,746	0.81	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	6,079	0.84	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,659	0.79	No

	BASIC F	REEWAY SE	GMENTS WORKSHEET		
General Information			Site Information		
Analyst Agency or Company Date Performed	AECOM		Highway/Direction of Travel From/To Jurisdiction	I-95 SB Seg 9-Bo	et 10th & Exit to Exp
Analysis Time Period	PM		Analysis Year	2040 Bu	ild 1
Project Description SW 10th	h Street SIMR		2 40		
✓ Oper.(LOS)			Jes.(N)		inning Data
Flow Inputs					
Volume, V AADT	7250	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjustn	nents				
f _p	1.00			1.2	
	1.5		$I_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985	
Speed Inputs			Calc Speed Adj and FFS	6	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	Measures		Design (N)		
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p) 1937 63.7 30.4 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v _p - Flow rate LOS - Level of service DDHV - Directional design ho	S - Speed D - Density FFS - Free-flow BFFS - Base freeur volume	speed ee-flow speed	E _R - Exhibits 11-10, 11-12 E _T - Exhibits 11-10, 11-11, 11- f _p - Page 11-18 LOS, S, FFS, v _p - Exhibits 11-2	13 2, 11-3	f _{LW} - Exhibit 11-8 f _{LC} - Exhibit 11-9 TRD - Page 11-11

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RAMPS AND RAMP JUNCTIONS WORKSHEET											
General Information Site Information											
Analyst Freew				eeway/Dir of Tr	Dir of Travel I-95 SB						
Agency or Company AECOM			Ju	Junction		Seg 10- Diverge to Express					
Date Performed			Ju	Jurisdiction							
Analysis Time Perio	d PM		An	Analysis Year			uild 1				
Project Description SW 10th Street SIMR											
Upstream Adj F	Ramp	Freeway Nurr	ider of Lanes, IN	4					Downstrea	am Adj	
	/ On	Ramp Numbe	er of Lanes, N	1					Ramp		
res 🗈	≤ On	Acceleration I	_ane Length, L _A						🗌 Yes	On	
No 🗌	Off	Deceleration	Deceleration Lane Length L _D 300							□ ∩#	
		Freeway Volu	me, V _F	7250							
L _{up} = 45	500 ft	Ramp Volume	e, V _R	770					L _{down} =	ft	
		Freeway Free	-Flow Speed, S	70.0						. . //-	
$V_u = 15$	560 veh/h	Ramp Free-F	low Speed, S _{FR}	о _{FF} 70.0					V _D =	ven/n	
Conversion t	to pc/h Un	der Base	Conditions						1		
(nc/h)	V	PHF	Terrain	%Truck	%Bv		f	f	V = V/PHF	x fx f	
(po/n)	(Veh/hr)		· · ·	7011000	/01.00		.HA	'p		HV A p	
Freeway	/250	0.95	Level	3	0	0.	985	1.00	()	46	
Ramp	//0	0.92	Level	2	0	0.	990	1.00	8	45	
UpStream	1560	0.92	Level	2	0	0.	990	1.00	1/	/13	
DownStream		Merge Areas					I	iverge Areas			
Estimation o	fva	inerge / ineue			Estimat	ion o	fv ₄₀	interge / incue			
	12	(D)			12 12						
	v ₁₂ – v _F	(^r _{FM})	40 T)		$v_{12} = v_R + (v_F - v_R) P_{FD}$						
L _{EQ} =	(Equa	ation 13-6 or	13-7)		$L_{EQ} = (Equation 13-12 \text{ or } 13-13)$						
P _{FM} =	using	Equation (=xhibit 13-6)		$P_{FD} = 0.436$ using Equation (Exhibit 13-7)						
V ₁₂ =	pc/h				v ₁₂ = 3854 pc/h						
V ₃ or V _{av34}	pc/h (Equation 13	-14 or 13-17)		V ₃ or V _{av34} 1946 pc/h (Equation 13-14 or 13-17)						
Is V_3 or $V_{av34} > 2,70$	00 pc/h? 🗌 Ye	s 🗌 No			Is V_3 or $V_{av34} > 2,700$ pc/h? Yes V No						
Is V_3 or $V_{av34} > 1.5$	*V ₁₂ /2 Ye	s 🗌 No			Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No						
If Yes,V _{12a} =	pc/h (13_19	Equation 13	-16, 13-18, or		If Yes,V _{12a} = pc/h (Equation 13-16, 13-18, or 13- 19)						
Canacity Checks					Capacity Checks						
Actual Capacity LOS F				LOS F?	Actual Capacity LOS F?						
					V _F		7746	Exhibit 13	-8 9600	No	
VEO		Exhibit 13-8			$V_{ro} = V_{r}$	V.,	6901	Exhibit 13	-8 9600	No	
FU					F0 F	· R	845	Exhibit 13-	10 2100	No	
Flow Entering	g werge m	Max	rea Desirable	Violation?	Flow Entering Diverge Influence Area						
V	Actual	Evhibit 13-8	Desilable	VIOIALION	V		101Udi 1854	Evhibit 13-8		No	
	l vico Dotorr	nination (if not E)			<u> </u>		torminatic	<i>if not</i>		
$D_{-} = 5.475 \pm 0.00734 \text{ y} \pm 0.0078 \text{ V} \pm 0.00627 \text{ J}$					$D_{-} = 4.252 \pm 0.0086 V_{-} = 0.0091$						
$D_{\rm r} = (\rm nc/mi/ln)$					D = 380 (nc/mi/ln)						
P_{R} (point/in)						$P_{R} = 30.0 \text{ (pc/m/m)}$					
LUS = (EXNIDIC 13-2)						LUS = E (Exhibit 13-2)					
Speed Determination						Speed Determination					
M _S = (Exibit 13-11)					D _s = 0.374 (Exhibit 13-12)						
S _R = mph (Exhibit 13-11)					S _R = 59.5 mph (Exhibit 13-12)						
S ₀ = mph (Exhibit 13-11)					S ₀ = 73.9 mph (Exhibit 13-12)						
S = mph (Exhibit 13-13)					S = 65	5.3 mph	(Exhibit	13-13)			
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2040 Build 1 Freeway HCS Operational Analysis

BASIC FREEWAY SEGMENTS WORKSHEET								
General Information			Site Information					
Analyst Agency or Company Date Performed	AECOM	Highway/Direction of Travel From/To Jurisdiction		I-95 SB Seg 11-Bet Off Exp Off Sample				
Analysis Time Period	PM		Analysis Year	2040 Bu	ild 1			
Project Description SW 10th	n Street SIMR		2 40					
✓ Oper.(LOS)			Des.(N)	Pla	inning Data			
Flow Inputs								
Volume, V AADT	6480	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3				
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi				
Calculate Flow Adjustn	nents							
f _p	1.00		E _R	1.2				
	1.5		$I_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985				
Speed Inputs			Calc Speed Adj and FFS	6				
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	4 70.0	ft ft ramps/mi mph mph	f _{LW} f _{LC} TRD Adjustment FFS	70.0	mph mph mph mph			
LOS and Performance	Measures		Design (N)					
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	k f _{HV} x f _p) 1731 66.7 25.9 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF x N x)$ S D = v_p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln			
Glossary			Factor Location					
N- Number of lanesS- SpeedV- Hourly volumeD- Densityvp- Flow rateFFS - Free-flow speedLOS- Level of serviceBFFS - Base free-flow speedDDHV - Directional design hour volume			$ \begin{array}{ll} {\sf E}_{\sf R} \mbox{ - Exhibits 11-10, 11-12} & {\sf f}_{\sf LW} \mbox{ - Exhibit 11-8} \\ {\sf E}_{\sf T} \mbox{ - Exhibits 11-10, 11-11, 11-13} & {\sf f}_{\sf LC} \mbox{ - Exhibit 11-9} \\ {\sf f}_{\sf p} \mbox{ - Page 11-18} & {\sf TRD} \mbox{ - Page 11-11} \\ {\sf LOS, S, FFS, v}_{\sf p} \mbox{ - Exhibits 11-2, 11-3} \end{array} $					

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BASIC FREEWAY SEGMENTS WORKSHEET									
General Information			Site Information						
Analyst Agency or Company AECOM Date Performed		Highway/Direction of Travel From/To Jurisdiction		I-95 SB Seg 13-Bet Off & On Ramps					
Analysis Time Period PM			Analysis Year	2040 Build 1					
Project Description SW 10th	h Street SIMR		- 4.0						
✓ Oper.(LOS)			Des.(N)	Pla	anning Data				
Flow Inputs									
Volume, V AADT	5170	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P _T	0.95 3					
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P _R General Terrain: Grade % Length Up/Down %	0 Level mi					
Calculate Flow Adjustn	nents								
f _p	1.00		E _R	1.2					
E _T	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.985					
Speed Inputs			Calc Speed Adj and FFS						
Lane Width		ft							
Rt-Side Lat. Clearance		ft	f _{LW}		mph				
Number of Lanes, N	3				mph				
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph				
FFS (measured)	70.0	mph	FFS	70.0	mph				
Base free-flow Speed, BFFS		mph							
LOS and Performance	Measures		Design (N)						
<u>Operational (LOS)</u> v _p = (V or DDHV) / (PHF x N x S D = v _p / S LOS	x f _{HV} x f _p) 1841 65.2 28.2 D	pc/h/ln mph pc/mi/ln	<u>Design (N)</u> Design LOS v _p = (V or DDHV) / (PHF x N x S D = v _p / S Required Number of Lanes, N	f _{HV} x f _p)	pc/h/ln mph pc/mi/ln				
Glossary			Factor Location						
N - Number of lanesS- SpeedV - Hourly volumeD- Densityvp- Flow rateFFS - Free-flow speedLOS- Level of serviceBFFS - Base free-flow speedDDHV - Directional design hour volume			$ E_{\rm R} - Exhibits 11-10, 11-12 \qquad \qquad f_{\rm LW} - Exhibit 11-10, 11-11, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-11, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-11, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-10, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-10, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-10, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-10, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-10, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-10, 11-11, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, 11-10, 11-10, 11-13 \qquad \qquad f_{\rm LC} - Exhibit 11-10, $						

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		F	REEWAY	WEAV	ING WOF	RKSHEE	Г			
General Information					Site Information					
Analyst Agency/Company AECOM Date Performed Analysis Time Period PM				Freeway/Dir Weaving Seg Analysis Yea	le & Copans					
Project Desc	cription SW 10th	n Street SIMR								
Inputs										
Weaving configurationOne-SidedWeaving number of lanes, N4Weaving segment length, Ls2520ftFreeway free-flow speed, FFS70 mph				Segment typ Freeway min Freeway ma Terrain type	Freeway 15 2400 Leve					
Convers	sions to po	/h Undei	r Base Co	ondition	s		1			
	V (veh/h)	PHF	Truck (%)	RV (%)	Ε _Τ	E _R	f _{HV}	fp	v (pc/h)	
V _{FF}	4430	0.95	3	0	1.5	1.2	0.985	1.00	4733	
V _{RF}	1580	0.92	2	0	1.5	1.2	0.990	1.00	1735	
V _{FR}	740	0.92	2	0	1.5	1.2	0.990	1.00	812	
V _{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0	
V _{NW}	4733					V =	7280			
V _w	2547							-	-	
VR	0.350									
Configu	ration Cha	racterist	ics		•					
Minimum maneuver lanes, N _{WL} 2 Ic					Minimum weaving lane changes, LC _{MIN}					
Interchange density, ID 0.7 int/m				0.7 int/mi	Weaving lan		lc/h			
Minimum RF lane changes, LC _{RF} 1 lc/pc				Non-weaving lane changes, LC _{NW}						
Minimum FR lane changes, LC _{FR} 1 lc/pc				Total lane changes, LC _{ALL}						
Minimum RI	R lane changes,	LC _{RR}		lc/pc	Non-weaving vehicle index, I _{NW} 105					
Weaving	g Segment	Speed,	Density, I	_evel of	Service,	and Cap	oacity			
Weaving segment flow rate, v Weaving segment capacity, c _w				7185 veh/h 6758 veh/h	Weaving inte Weaving seg		mph .			
Weaving segment v/c ratio 1.063				1.063	Average weaving speed, 5 _w				mph	
Weaving segment density, D pc				pc/mi/ln	Average non-weaving speed, S _{NW}				mph	
				Maximum weaving length, L _{MAX} 6125 ft						
NOTES a. Weaving so Chapter 13, " b. For volume	egments longer th Freeway Merge a s that exceed the	an the calcula nd Diverge Se weaving segn	ted maximum le gments". nent capacity, th	ength should l	be treated as is rvice is "F".	olated merge	and diverge an	eas using the	procedures of	

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