APPENDIX Q

YEAR 2030 TRAFFIC CONDITIONS FREEWAY RAMP LEVEL OF SERVICE CALCULATION WORKSHEETS – CALTRANS FACILITIES ANALYSIS (HCM METHODOLOGY)

APPENDIX Q-I

YEAR 2030 WITHOUT PROJECT TRAFFIC CONDITIONS – CALTRANS FREEWAY RAMP ANALYSIS (HCM METHODOLOGY)

MERGE/DIVERGE ANALYSIS

		RAMP	S AND	RAM	P JUN	CTIONS	S WC	DRKSH	EET		
General	Informati	on			<u> </u>	Site In	form	ation			
Analyst2 Agency or Co Date Perform Analysis Tim	ned e Period	ZS LLG Engi 07/14/10 AM Peak	Hour	4 I E ND (Ju Ju Ai	reeway/Dir on contion arisdiction nalysis Year	of Trav		Caltrans	o at Katella D12 0 without Proj	ect
	ription AM Yo	ear 2030 With	out Projec	I I-5 NB C	Jn-Kamp	at Katella					
<i>Inputs</i> Upstream Ad	j Ramp	Terrain Leve	el .		·					Downstrea	nm Adj Ramp
▼ Yes	☑ On									Yes	ि On
No No	l™ Off									I No L _{down} =	ि Off ft
L _{up} =	1400 ft									aown	
Vu =	370 veh/h	•	S _{FF} = 70		show lane	es, L _A , L _D ,V	• • •	35.0 mph		Vo =	veh/h
Convers	ion to pc	h Under	Base	Condi	tions					•	
(pc/h)	V (Veh/hr)	PHF		rain	Truck	%Rv		HV	f _p	v=V/PHF f	HV ^f p
Freeway Ramp	5230 256	0.95 0.95	Lev Lev		9	0	0.9		1.00	5753	
UpStream	370	0.95	Lev		9	0	0.9		1.00	282 407	
DownStream		0.00	LCY	01			0.8	731	1.00	407	
	· · · · · · · · · · · · · · · · · · ·	Merge Areas						Di	verge Area	 as	
Estimati	on of v ₁₂				i	Estima	tion	of V ₁₂	-		
	ation 25-2 or 2 using Equatio						ing Eq	25-8 or 25	= V _R + (V _F i-9)	V _R)P _{FD}	
Capacity	Checks					Capaci	ty C	hecks			
	Actua	l Max	imum	LOS	S F?			Actual	М	aximum	LOS F?
						V _{FI} =V _F			See E	xhibit 25-14	
V _{FO}	6035	See Exi	nibit 25-7	No)	V ₁₂			4	400:All	
V _{R12}	2249	460	0:All	No)	$V_{FO} = V_{F}$ V_{R}	-		See E	xhibit 25-14	
						V_R			See E	Exhibit 25-3	
Level of	Service E	etermina	ation (if not l	5)	Level o	f Se	rvice D	eterm	ination (in	f not F)
D _R = !	5.475 + 0.0073	4 v _R + 0.007	8 V ₁₂ - 0.0	00627 L _A						/ ₁₂ - 0.009 L _D	
D _R = 19.	8 (pc/ m/ln)	••		• • • • • • • • • • • • • • • • • • • •		D _R = (pc/ m/			0	
LOS = B (Exhibit 25-4)					LOS= (Exhibi	t 25-4)			
Speed E	stimation					Speed	Esti	mation		. '	
	23 (Exibit 25-							oit 25-19)			
	20 (Exhibit 20- 0 mph (Exhibi	-					•	Exhibit 25-1	19)		
	0 mph (Exhibi				1			Exhibit 25-	•		
	4 mph (Exhibi	•					•	Exhibit 25-1	•		
TM						<u> </u>	h., /r		~/		

Copyright © 2000 University of Florida, All Rights Reserved

		RAMP	SAND	RAMI	P JUN	CTIONS	WORK	SHE	ET		
General l	Informati						formati				
Analyst2 Agency or Co Date Performe Analysis Time Project Descri	ed Period	ZS LLG Engi 07/14/10 PM Peak	Hour	ALE ND	Ju Ju Aı	eeway/Dir on the control of the cont		(Caltrans D	at Katella 012) without Proje	ect
Inputs	puon Pivi te	ar 2000 With	out Projec	a i-5 NB C	эп-катр	at Katelia					
Upstream Adj		Terrain Leve	l							Downstrea	m Adj Ramp
₩ Yes	I⊠ On									Yes	l™ On
⊠ No	l off									L _{down} =	E Off ft
L _{up} = 1	1400 ft									- down	
Vu = 5	570 veh/h		S _{FF} = 70		show lane	s, L _A , L _D ,V	S _{FR} = 35.0 _R ,V _f)	mph		VD =	veh/h
Conversi	on to pc/	h Under	Base	Condi	tions	_					
(pc/h)	V (Veh/hr)	PHF	Ten		Truck	%Rv	f _{HV}		f _p	v=V/PHF f	_{HV} f _p
Freeway Ramp	8290 395	0.95 0.95	Lev Lev		9	0	0.957 0.957	_	1.00	9119 435	
UpStream	570	0.95	Lev		9	0	0.957	+	1.00	627	
DownStream						Ů	0.00.	-	1100	1 02.	
		Merge Areas			-:				rge Area	S	
Estimatio	on of v ₁₂					Estima	tion of	v ₁₂			
L _{EQ} = (Equa P _{FM} = 0.323 V ₁₂ = 2943	ition 25-2 or 29 using Equation		i				uation 25-6 ing Equation	3 or 25-9		- V _R)P _{FD}	·
Capacity	Checks					Capaci	ty Chec	ks			
	Actual	Max	mum	LOS	F?		Ad	ctual	Ma	aximum	LOS F?
V _{FO}	9554	See Ext	nibit 25-7	No)	V _{FI} =V _F	:			khibit 25-14 100:All	
V _{R12}	3378	460	0:All	No)	V _{FO} = V _F	-		See Ex	khibit 25-14	
	1					V _R			<u> </u>	xhibit 25-3	
	Service D				5)	Level o				nation (ii	not F)
	.475 + 0.0073 5 (pc/ m/ln)	4 v _R + 0.007	8 V ₁₂ - 0.6	00627 L _A		D _R = (D _R = 4 pc/ m/ln)	.252 +	0.0086 V	₁₂ - 0.009 L _D	
	xhibit 25-4)						Exhibit 25-	4)			
Speed Es	timation		***************************************			Speed					
	0 (Exibit 25-	19)			· · · · · · · · · · · · · · · · · · ·		(Exhibit 25				
S _R = 58.8	mph (Exhibit	25-19)				S _R = r	nph (Exhib	it 25-19	=		
	mph (Exhibit) mph (Exhibit)	•				"	nph (Exhib nph (Exhib		•		
acTM	A. /	· · /		- C C C C C T		f Florida All	• •				Vors

Copyright © 2000 University of Florida, All Rights Reserved

		RAM	PS AN	D RAMF	JUNC	TIONS W	ORKSHE	ET	·		
General Info	rmation			Sit	te Infor						
Analyst		ZS			Fre	eeway/Dir	of Travel	I-	5 SB		
Agency or Co		LLG Eng	ineers	;	Jui	nction				p at Kate	lla
Date Performe	ed	07/14/10			Jur	risdiction			altrans l		
Analysis Time	Period	AM Peak	Hour		An	alysis Ye	ar	Y	ear 203	0 withou	it Project
Project Descri	iption AM	Year 2030	witho	ut Projec	t I-5 SB	Off-Ram	p at Katel	а			
Inputs						·					
Upstream Adj	·	Terrain Le	vel							Downstr Ramp	ream Adj
	On									ि Yes	l≣ On
□ No 🔽	Off									™ No	□ Off
$L_{up} = 11$	30 ft									L _{down} =	ft
'	^ '"	S	• •	70.0 mph			$_{FR} = 35.0$) mph	1	VD =	veh/h
	0 veh/h				how lar	nes, L _A , L	$_{D}, V_{R}, V_{f})$				VCIIII
Conversion t	o pc/h Und	ler Base C	onditi	ons		.		,			
(pc/h)	V (Veh/hr)	PHF	Те	rrain	Truck	%Rv	f _{HV}		$f_{\mathbf{p}}$	v=V/PHI f _{HV} f _p	F
Freeway	6230	0.95	Le	vel	9	0	0.957	1	1.00	6853	
Ramp	919	0.95	Le	vel	9	0	0.957		1.00 1011		
UpStream	730	9	0	0.957		1.00	803				
DownStream											
		rge Areas						Dive	rge Area	as	
Estimation of	f v ₁₂					Estimati	on of v ₁₂				
	V ₁₂ =	·V _F (P _{FM})					V	12 = \	V _P + (V _E	- V _R)P _{FD}	
L _{EQ} = (Equat						L _{EO} = (E	quation 25	***		10 10	
P _{FM} = using E		,					260 using				
V ₁₂ = pc/h	quudon						_	Lqu	auon o		
Capacity Che	oke					$V_{12} = 22$	/ Checks				
Capacity Cire	T	Movin	11110	100	E2	Capacit		al l	Maxi	mum I	LOS E2
	Actual	Maxim		LOS	• •	\/ =\/	5820	\rightarrow		mum 00	LOS F? No
V_{FO}		See Exhi	bit 25-		}	V _{FI} =V _F	\rightarrow	1			
		 '				V ₁₂	226	,	440	0:All	No
V _{R12}		4600:	Ali			$V_{FO} = V_{F}$ V_{R}	481:	5	960	00	No
						V_R	101	i	380	00	No
Level of Serv	ice Detern	nination (it	not F)		Level of	Service L	eter)	minatio	n (if not l	5)
D _R = 5.475 +	+ 0.00734 v	R + 0.0078	3 V ₁₂ -	0.00627	L_A		$D_{R} = 4.25$	52 + (0.0086 V	/ ₁₂ - 0.009	9 L _D
D _R = (pc/ n	•					· · ·	4.8 (pc/ m	•			
LOS = (Exhil						1	A (Exhibit)	<u>.</u>	
Speed Estima	ation					Speed E	stimation				
M _S = (Exibi	it 25-19)					$D_s = 0$	0.519 (Ex	hibit 2	25-19)		
S _R = mph	(Exhibit 25-	-19)				S _R =	55.5 mph	(Exh	ibit 25-1	9)	
	· (Exhibit 25-	-19)				S ₀ = ′	73.7 mph	(Exh	ibit 25-1	9)	
_	(Exhibit 25-	•				l -	65.4 mph	(Exh	ibit 25-1	5)	-
uanaTM	S = 65.4 mph (Exhibit 25-15)										

 $HCS2000^{\mathrm{TM}}$

Copyright © 2000 University of Florida, All Rights Reserved

formation	RAN	IPS AN			TIONS W	ORKSI	EET			
<i>formation</i> Company	ZS LLG Eng	gineers		Fre	•	of Trav			np at Kate	ella
						ar	(Caltrans	D12	
			ut Projec				دااء			**
onpaon n	. rour zoo	. Williams	at 1 10jec	ALTO OL	, On Itali	ip at ital	Cila			
•	Terrain Le	evel					·		Downst Ramp	ream Adj
									☐ Yes	ि On
☑ Off						-			1	
1130 ft	<u> </u>		70.0			- 2/	0	1 -	l_down =	ft
590 veh/h	3					•	o.u mp	n	VD =	veh/h
n to pc/h Un	der Base (Conditi	ons							
V (Veh/hr)	PHF	Те	rrain	Truck	%Rv	f _{HV}		f _p	v=V/PH f _{HV} f _p	F
7770	0.95	Le	vel	9	0	0.957		1.00	8547	
407	0.95	vel	9	0	0.957		1.00	448		
590	0.95	Le	vel	9	0	0.957		1.00	649	
	erge Areas				Cationati	·		erge Are	eas	
					Esumati					
					/-			• • •	F - VR)PFC)
	25-3)								•	•
					1 . –			uation i	U	
	Mayin	oum	108	E2	Capacit			Max	/imum	LOS F?
Actual			LOS	1 :	V=V_	_		1		No
	_			ŀ				 		No
						63	90	96	500	No
V _{R12} 4600:All										
					V_R	44	18	38	300	No
ervice Determ						Service	Dete	minatio	on (if not i	5)
ervice Determ 5 + 0.00734 \				L _A		Service	Dete	minatio		5)
5 + 0.00734 \ / mi /ln)				• • • • •	Level of	Service	Dete 252 +	minatio	on (if not i	5)
5 + 0.00734 v / mi /ln) (hibit 25-4)				• • • • •	Level of	Service D _R = 4.	<i>Detei</i> 252 + mi /ln)	<i>minatio</i> 0.0086	on (if not i	5)
5 + 0.00734 \ / mi /ln)					Level of D _R = 1 LOS= 2 Speed E	Service D _R = 4. 3.5 (pc/ A (Exhit	Deter 252 + mi /ln) oit 25-4	o.0086	on (if not i	5)
5 + 0.00734 v / mi /ln) (hibit 25-4)					Level of D _R = 1 LOS= 2 Speed E D _s = 1	Service D _R = 4. 3.5 (pc/ A (Exhit stimatic 0.468 (E	Deter 252 + mi /ln) bit 25-4 on	minatio 0.0086	on (if not i	5)
5 + 0.00734 v / mi /ln) :hibit 25-4) :mation	r _R + 0.007				Level of D _R = : LOS= : Speed E D _s = : S _R = :	Service D _R = 4. 3.5 (pc/ A (Exhite stimation 1).468 (E. 56.9 mp	Deter 252 + mi /ln) oit 25-4 on Exhibit	7 minatio 0.0086 1) 25-19) nibit 25-	on (if not i V ₁₂ - 0.00	5)
5 + 0.00734 v / mi /ln) (hibit 25-4) <i>mation</i> (ibit 25-19)	r _R + 0.007				Level of D _R = LOS= Speed E D _s = S _R = S ₀ =	Service D _R = 4. 3.5 (pc/ A (Exhit stimatic 0.468 (E	Deter 252 + mi /ln) bit 25-/ on Exhibit bh (Exh	25-19) nibit 25-	19)	5)
	Adj Ramp On Off 1130 ft 590 veh/h No pc/h Un V (Veh/hr) 7770 407 590 am Me Nof v ₁₂ Ustion 25-2 or G Equation	Company rmed 07/14/10 me Period PM Peak Scription PM Year 2036 Adj Ramp Terrain Level Off 1130 ft S 590 veh/h n to pc/h Under Base Of V12 V12 = VF (PFM) Lation 25-2 or 25-3) g Equation Checks Actual Maxim See Exh	Company LLG Engineers 07/14/10 me Period PM Peak Hour scription PM Year 2030 without Padj Ramp Terrain Level Ton Off 1130 ft S FF = 15 590 veh/h S n to pc/h Under Base Condition V (Veh/hr) PHF Teres 100 PHF	Company LLG Engineers 07/14/10 me Period PM Peak Hour Scription PM Year 2030 without Project Adj Ramp Terrain Level On Off 1130 ft S FF = 70.0 mph Sketch (smooth open to peh Under Base Conditions V (Veh/hr) PHF Terrain 7770 0.95 Level 407 0.95 Level 407 0.95 Level Merge Areas Merge Areas For V12 V12 = VF (PFM) Juation 25-2 or 25-3) G Equation Checks Actual Maximum LOS See Exhibit 25-	Company LLG Engineers 07/14/10 June Period PM Peak Hour An Scription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level Adj Ramp Terrain Level On Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level On Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level On Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level On Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level Secription PM Year 2030 without Project I-5 SE Adj Ramp Terrain Level Secription PM Year 2030 without Project I-5 SE Exhibit 25- Adj Ramp Terrain Level Secription PM Year 2030 without Project I-5 SE Exhibit 25- Adj Ramp Terrain Level Secription PM Year 2030 without Project I-5 SE Exhibit 25- Adj Ramp Terrain Level	Company LLG Engineers $07/14/10$ Jurisdiction $07/14/10$ Jurisdiction $07/14/10$ Analysis Yesteription PM Year 2030 without Project I-5 SB Off-Rame Adj Ramp Terrain Level To On Sketch (show lanes, L _A , Level Secription PMF Terrain Truck Secription On Secription PMF Terrain Truck Secription On Secreption On Secreptio	Company LLG Engineers Junction Jurisdiction	Company LLG Engineers Junction Company Compan	Company LLG Engineers Junction Off-Ran Caltrans Year 20. The Period PM Peak Hour Analysis Year Year 20. Adj Ramp Form On PM Year 2030 without Project I-5 SB Off-Ramp at Katella Terrain Level Sketch (show lanes, L_A , L_D , V_R , V_f) To position PHF Terrain Truck Revel 9 0 0.957 1.00 To position PHF Terrain Truck Revel 9 0 0.957 1.00 To position PHF Terrain Physical	Company LLG Engineers Junction Off-Ramp at Kate

Copyright © 2000 University of Florida, All Rights Reserved

		RAMP	S AND	RAMI	P JUN	CTIONS	WOR	KSHE	ET		- · · · ·
General	Informati	ion				Site Int	format	tion			
Analyst2 Agency or Co Date Perform Analysis Time Project Descr	ed	ZS LLG Engi 07/14/10 AM Peak ear 2030 with	Hour	t SR-57 N	Ju Ju Ar	eeway/Dir on the control of the cont		E	altrans D	mp at Katella	
Inputs	·										
Upstream Adj	Ramp	Terrain Leve	1					•		Downstrea	ım Adj Ramp
☑ Yes	∭ On									✓ Yes	☑ On
I No	Off										. Off 1090 ft
L _{up} =	ft									L _{down} =	1030 It
	veh/h	;	S _{FF} = 70		show lane	S S, L _A , L _D , V	S _{FR} = 35. _B ,V _f)	0 mph		VD =	240 veh/h
Convers	ion to pc	h Under	Base	Condi	tions						
(pc/h)	V (Veh/hr)	PHF		rain	Truck	%Rv	f _{HV}		f _p	v=V/PHF f	HV ^f p
Freeway	4350	0.95	Lev	rel .	6	0	0.971		1.00		
Ramp	415	0.95	Lev	rel	6	0	0.971		1.00		
UpStream DownStream	240	0.95	Lev	rol .	6	0	0.971		1.00	260	
Downsteam	240	Merge Areas		· CI	1 "	U	0.971	<u> </u>	rge Area		
Estimation	on of V ₁₂	morgo / nous	<u> </u>			Estima	tion o	fv_{42}	19071100	<u> </u>	
L _{EQ} = (Equa P _{FM} = 0.321 V ₁₂ = 1180	V ation 25-2 or 2 using Equation)			L _{EQ} = (Eq P _{FD} = usi V ₁₂ = pc/l	uation 25	V ₁₂ = 5-8 or 25-9	V _R + (V _F	- V _R)P _{FD}	
Capacity	Checks					Capaci	ty Che	ecks			
	Actua	ıl Max	imum	LOS	S F?			Actual	Ма	ximum	LOS F?
.,						V _{Fi} =V _F			See Ex	hibit 25-14	
V _{FO}	4129	See Ex	nibit 25-7	No	0	V ₁₂			44	00:All	
V _{R12}	1630	460	0:All	No	0	$V_{FO} = V_{F}$ V_{R}	-			hibit 25-14	
		ــِـــــــــــــــــــــــــــــــــــ			P#1	V _R			<u> </u>	xhibit 25-3	
Level of					<u> </u>	Level o				nation (i	not F)
	5.475 + 0.0073	34 V _R + 0.007	8 V ₁₂ - 0.	00627 L _A		<u> </u>	• • • • • • • • • • • • • • • • • • • •	4.252 +	U.UU86 V.	₁₂ - 0.009 L _D	
] '`	8 (pc/ m/ln)					l '`	pc/ m/ln)				
	Exhibit 25-4)						Exhibit 2				
Speed Es	stimation	<u> </u>				Speed .	Estim	ation			
M _S = 0.30	06 (Exibit 25	-19)				D _s =	(Exhibit 2	25-19)			
S _R = 61.4	4 mph (Exhib	it 25-19)				S _R = r	nph (Exh	ibit 25-19)		
S ₀ = 67.3	3 mph (Exhib	it 25-19)				S ₀ = mph (Exhibit 25-19)					
	mph (Exhib	it 25-14)			S = mph (Exhibit 25-15)						

Copyright © 2000 University of Florida, All Rights Reserved

		RAMP	S AND	RAMI	P JUN	CTIONS	W	ORKS	HE	ET	·	
General	Informati	on				Site Int	forn	natio	7			
Analyst2 Agency or Co Date Perform Analysis Time	ed Period	ZS LLG Engi 07/14/10 PM Peak	Hour		Ju Ju Ar	eeway/Dir on the control of the cont	-		E C	altrans D	np at Katella 12 without Proje	
	iption PM Ye	ear 2030 with	out Projec	t SR-5/ N	AR FR Ou	-Ramp at K	atella	1	-			
Inputs		Terrain Leve									<u> </u>	
Upstream Ad	Ramp	renam Leve	71									m Adj Ramp
₩ Yes	∭ On										⊠ Yes No	☑ On ፴ Off
I ✓ No	I Off										L _{down} =	1090 ft
L _{up} =	ft							'			GOWII	
Vu =	veh/h	;	S _{FF} = 70		show lane	s, L _A , L _D ,V	111	35.0 m	ph		VD =	520 veh/h
Convers	ion to pc	h Under				· A D	Λ· P				_1	
(pc/h)	V (Veh/hr)	PHF	Теп		Truck	%Rv		f _{HV}		f _p	v=V/PHF f	√ fp
Freeway	8410	0.95	Lev	el	6	0	0.	971		1.00	9118	
Ramp	523	0.95	Lev	el	6	0	0.	971		1.00	567	
UpStream	500	0.05					_	A71	_	1.00		
DownStream	520	0.95 Merge Areas	Lev	el	6	0	U.	971		1.00 rge Areas	564	
Estimation	on of v ₁₂	INCIGE AIGAS	<u> </u>			Estima	tior	of v	12	ige Aleas)	
	V	₁₂ = V _F (P _{FM})					\	/ ₁₂ = \	/ _R + (V _F -	· V _R)P _{ED}	
L _{EQ} = (Equa	ation 25-2 or 2					L _{EQ} = (Eq	uatio				10 15	
1	using Equatio					P _{FD} = usi						
V ₁₂ = 2027						V ₁₂ = pc/l						
Capacity						Capaci		heck	S			
o apaoney	Actua	l May	imum	109	SF?	oupuoi	., .	Actu		Mar	ximum	LOS F?
	710100	, IVION	anian		, ,	V =V		Aoto	ici	-	hibit 25-14	2001:
V_{FO}	7185	See Ex	hibit 25-7	Ne	0	V _{FI} =V _F						
						V ₁₂				441	IIA:00	
V _{R12}	2594	460	DO:All	N(0	$V_{FO} = V_{F}$ V_{R}	-			See Ex	hibit 25-14	
						V_{R}				See Ex	chibit 25-3	
Level of	Service L	etermin	ation (if not l	F)	Level o	f S	ervice	e De	termir	nation (il	not F)
D _R = 6	5.475 + 0.0073	34 v _R + 0.007	78 V ₁₂ - 0.1	00627 L	···						₂ - 0.009 L _D	
1	3 (pc/ m/ln)		,,,	,,		D _R = (pc/ m	• • •		•	2 0	
1	Exhibit 25-4)					! ''		, oit 25-4)		•		
Speed Es				:		Speed			on			
	38 (Exibit 25-				<u> </u>	D _s =		ibit 25-1		· .		
B .	5 mph (Exhibi	•				ľ	nph ((Exhibit	25-19)		:
1	5 mph (Exhibi	•				l	nph	(Exhibit	25-19))		
	4 mph (Exhibi					1 *	-	Exhibit		-		

 $HCS2000^{\mathrm{TM}}$

		RAMP	SAND	RAM	P JUN	CTIONS	S WC	ORKS	HE	ET		
General l	nformat	ion				Site In:	forn	natior	7			
Analyst2 Agency or Col Date Performe Analysis Time Project Descri	ed Period	ZS LLG Engi 07/14/10 AM Peak ear 2030 with	Hour	t SR-57 S	Ju Ju Ar	eeway/Dir onction risdiction nalysis Yea	Г		W C	altrans C	amp at Katella	
Inputs	paon / m i		out rojot	COICOIC	JO 110 ()	rramp at i	vacono.				-	
Upstream Adj	Ramp	Terrain Leve									Downstrea	m Adj Ramp
T Yes	J≣ On										✓ Yes	☑ On ☑ Off
	™ Off	!									L _{down} =	1015 ft
-up =	ft	 	S _{FF} = 70	0 mph			· -	25 0 m	nh.		-	400
	veh/h			Sketch (es, L _A , L _D ,V		35.0 mj	Л		VD =	180 veh/h
Conversi		/h Under	Base	Condi	tions		Γ.					
(pc/h)	V (Veh/hr)	PHF 0.95	Ter		Truck	%Rv	1	f _{HV}		f _p	v=V/PHF f _i	_{tV} f _p
Freeway Ramp	7390 229	0.95	L.ev Lev		6	0		971 971		00.1 00.1	8012 248	
UpStream		5.55		-				,,,			2.0	<u> </u>
DownStream	180	0.95	Lev	el	6	0	0.9	971		1.00	195	
Estimatio	n of v	Merge Areas	i		- 10	Estima	tion	of v		ge Area	S	
- _{EQ} = (Equa - _{FM} = 0.346 -/ ₁₂ = 2773	ition 25-2 or 2 using Equatio	•				L _{EQ} = (Ed P _{FD} = us V ₁₂ = pc/	ing Eq	1 25-8 o			- V _R)P _{FD}	Materia Mi
Capacity	Checks					Capaci	ity C	heck	S			
	Actua	l Max	imum	LOS	3 F?			Actu	al	Ma	ximum	LOS F?
V_{FO}	8260	See Ext	nibit 25-7	No	0	V _{FI} =V _I	F				chibit 25-14 100:All	
V _{R12}	3021	460	0:Ali	No	o ·	$V_{FO} = V_F$ V_R	-				khibit 25-14	
						V_R				See E	xhibit 25-3	
)etermina			5)	Level c	of Se	rvice	De	termi	nation (il	not F)
	.475 + 0.0073	34 v _R + 0.007	8 V ₁₂ - 0.0	00627 L _A				_R = 4.2	52 + 0	.0086 V	₁₂ - 0.009 L _D	
••	(pc/ m/ln)					'`	(pc/ m/	•				
	xhibit 25-4)							it 25-4)				
Speed Es	timation	1				Speed				 		
M _S = 0.36	6 (Exibit 25	-19)				D _s =	•	bit 25-19	•			
••	mph (Exhib	it 25-19)				•••		Exhibit 2				
•	mph (Exhib	•				•	•	Exhibit		-		
S= 60.9	mph (Exhib	it 25-14)				S = r	nph (Exhibit 2	25-15)			

Copyright © 2000 University of Florida, All Rights Reserved

		RAMP	S AND	RAMI	PJUN	CTIONS	W	ORKS	HE	ΞT		
General	Informati	on	<u> </u>			Site Int	forn	nation				
Analyst2 Agency or Co Date Perform Analysis Time	ed	ZS LLG Engi 07/14/10 PM Peak			Ju Ju	reeway/Dir on the control of the con		vel	W Ca	altrans D1	np at Katella 2 vithout Proje	
	iption PM Ye			t SR-57 S				<u> </u>	10	ai 2000 y	<u>minout r roje</u>	;UL
Inputs	<u> </u>					· · · · · · · · · · · · · · · · · · ·		- ,				
Upstream Ad	Ramp	Terrain Leve	el								Downstrea	m Adj Ramp
	™ On		٠								▼ Yes	⊠ On
™ No	™ Off										I No	∭ Off
L _{up} =	ft	-	n - 70	0			·	05.0			L _{down} =	1015 ft
	veh/h			Sketch (es, L _A , L _D ,V	• • • •	35.0 mpl	n		Vo≃	510 veh/h
Convers	ion to pc	/h Under	Base	Condi	tions							
(pc/h)	V (Veh/hr)	. PHF	Ten	rain	Truck	%Rv		f _{HV}		f _p	v=V/PHF f _l	_{tV} f _p
Freeway	7570	0.95	Lev		6	0		971		.00	8207	
Ramp	412	0.95	Lev	el	6	0 "	0.9	971	1	.00	447	
UpStream DownStream	510	0.95	Lev	el	6	0	0.0	971	1	.00	553	
Dominououm	1 010 1	Merge Areas			. •		0			ge Areas	555	
Estimation	on of v ₁₂					Estima	tion			<u> </u>		
L _{EQ} = (Equa P _{FM} = 0.321 V ₁₂ = 2636	ation 25-2 or 2 using Equatio)			L _{EQ} = (Ec P _{FD} = us V ₁₂ = pc/	ing Ed	n 25-8 or	_	' _R + (V _F -	V _R)P _{FD}	:
Capacity	Checks					Capaci	ty C	hecks	5			
	Actua	l Max	imum	LOS	SF?			Actua		Max	imum	LOS F?
V_{FO}	8654	See Ex	hibit 25-7	No	0	V _{FI} =V _F	-			See Exh	ibit 25-14	
						V ₁₂				440	0:All	
V _{R12}	3083	460	IIA:00	No	0	V _{FO} = V _F V _R	-			See Exh	ibit 25-14	
						V_{R}				See Ext	nibit 25-3	
Level of	Service E	etermin	ation (i	if not l	<u>5) </u>	Level o	f Se	ervice	De	termin	ation (if	not F)
$D_R = 5$	5.475 + 0.0073	34 v _R + 0.007	78 V ₁₂ - 0.0	00627 L _A			[O _R = 4.25	2 + 0	.0086 V ₁₂	- 0.009 L _D	
D _R = 26.3	2 (pc/ m/ln)		_			D _R = (pc/ m	/ln)				
LOS = C(I	Exhibit 25-4)					LOS= (Exhib	it 25-4)				
Speed Es	stimation					Speed	Esti	matio	n			
	71 (Exibit 25-					D _s =	(Exhi	bit 25-19)	•		
S _R = 59.0	6 mph (Exhibi	it 25-19)				S _R = r	nph (Exhibit 2	5-19)	-		
	ô mph (Exhibi	t 25-19)				S ₀ = г	nph	(Exhibit 2	5-19))		
	2 mph (Exhibi	t 25-14)	 .			S= 1	nph (Exhibit 2	5-15)			

Copyright © 2000 University of Florida, All Rights Reserved

WEAVING ANALYSIS

General Informat Analyst Agency/Company Date Performed Analysis Time Period	zion ZS			Site Info	rmation			
Agency/Company Date Performed	78			Oite mio	mauvii			
•	LLG E 07/14/	ngineers 10 eak Hour		Freeway/Dir o Weaving Seg Jurisdiction Analysis Year	Location	Caltra	7 NB gewood On to ans D12 2030 without	
nputs			·····		·			
reeway free-flow speed, Veaving number of lanes, Veaving seg length, L (ft) Terrain		65 5 136 Lev		Weaving type Volume ratio, Weaving ratio	VR		B 0.: 0.:	
Conversions to p	oc/h Unde	r Base C	onditio	าร				
pc/h) V	PHF	Truck %	RV %	E _T	ER	fHV	fp	٧
/o1 4030	0.95	6	0	1.5	1.2	0.971	1.00	4369
/02 20	0.95	6	0	1.5	1.2	0.971	1.00	21
/w1 835	0.95	6	0	1.5	1.2	0.971	1.00	905
/w2 320	0.95	6	0	1.5	1.2	0.971	1.00	346
/w	. <u>* </u>		1251	Vnw		<u> </u>	<u> </u>	4390
/								5641
Weaving and No	n-Weavin	q Speeds	 }		······································			
<u> </u>		Unconstr				Cons	trained	
	Weaving	(i = w)	Non-Wea	ving (i = nw)	Weavir	ng (i = w)	Non-Wea	ving (= nv
(Exhibit 24-6)	0.08		<u> </u>	.00				
(Exhibit 24-6)	2.20			.00			-	
: (Exhibit 24-6) I (Exhibit 24-6)	0.70			.00 .50			<u> </u>	
Veaving intensity factor, Wi	0.46		-	.20				
Veaving and non-weaving	52.6			0.70				
peeds, Si (mi/h)	B .							
lumber of lanes required Maximum number of lanes		ied operation,	, INW	1.34 3.50				
☑ If Nw < Nw		trained operat	ion		if Nw > Nv	v (max) const	rained operati	on
Weaving Segme	<u> </u>						•	
Veaving segment speed,			58.70	· ,				
Veaving segment density			19.22					
evel of service, LOS		· · · · · · · · · · · · · · · · · · ·	В					
Capacity of base condition	n, c _b (pc/h)		11380					
Capacity as a 15-minute fl	ow rate, c (vel	ı/h)	11049					
Capacity as a full-hour vol	ume, c _h (veh/h)	10497					
Votes			<u></u>					

- a. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases. f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C). g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases. h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases. I. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

 $HCS2000^{\mathrm{TM}}$

Copyright @ 2003 University of Florida, All Rights Reserved

Genera	l Informat	ion			ING WOF		<u> </u>			
Analyst Agency/Cor Date Perfor Analysis Tir	mpany med	ZS LLG I 07/14	Engineers /10 eak Hour		Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	of Travel g Location	Caltra	7 NB gewood On to ans D12 2030 without		
inputs							, , ,			
Freeway fre Weaving nu Weaving se Terrain	e-flow speed, imber of lanes, g length, L (ft)	N ·	65 5 136 Lev	rel	Weaving type Volume ratio Weaving ratio	, VR		B 0.15 0.48		
	sions to p		1	· · · · · · · · · · · · · · · · · · ·	1			T .	1	
(pc/h)	V	PHF	Truck %	RV %	Ε _T	E _R	fhv	fp	V	
Vo1	7750	0.95	6	0	1.5	1.2	0.971	1.00	8402	
Vo2	30	0.95	6	0	1.5	1,2	0.971	1.00	32	
Vw1	728	0.95	6	0	1.5	1.2	0.971	1.00	789	
Vw2	660	0.95	6	0	1.5	1.2	0.971	1.00	715	
Vw	_			1504	Vnw				8434	
V	/eaving and Non-Weaving Speed								9938	
Weavin	g and No	n-Weavin		The state of the s						
		Mooving	Unconstr		ina (i = nud	Maguin		trained		
a (Exhibit 24	1-6)	Weaving 0.0		0.0	ring (i = nw)	vveavir	ıg (i = w)	Mou-Mea	ving (= nw)	
(Exhibit 24		2.2		6.0				 		
Exhibit 24		0.7		1.0				 		
Exhibit 24	1-6)	0.5)	0.5	50					
Veaving intensi		0.6)	0.2	25					
Weaving and no speeds, Si (mi/h	n-weaving i)	49.3	3	58.	96					
Maximum nu	anes required to umber of lanes If Nw < Nw	, Nw (max) (max) uncons	trained operat	ion				ained operati	on	
	g Segmer		Density,		Service,	and Cap	acity			
	gment speed, s			57.27	<u> </u>					
	gment density,	D (pc/mi/ln)		34.71						
evel of sen	vice, LOS base condition	c (nc/h)		1150G						
	a 15-minute flo		ı/b\	11586						
	a full-hour volu			11249 10687						
Notes		mo, oh (venn	1	10007						
Weaving segr Capacity cons Capacity occu Three-lane Typ Capacity consi Four-lane Typ Capacity consi Five-lane Typ	ments longer than 2 strained by basic from under constraine upe A segments do no e A segments do no e A segments do no e A segments do no en segments do no	eway capacity. d operating condi- not operate well a ot operate well at n allowable weavin of operate well at	tions. t volume ratios gre volume ratios grea ng flow rate: 2,800	ater than 0.45. Po ter than 0.35. Poo pc/h (Type A), 4,0 ter than 0.20. Poo	or operations and so or operations and so 000 (Type B), 3,500 or operations and so	some local queuir ome local queuiro (Type C). ome local queuiro	ng are expected in are expected in are expected in s	such cases. such cases.		

O	1		FREEWA	T WEAV	ING WOF		<u> </u>		
Genera	Informat	ion			Site Info	rmation			
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14/	ngineers 10 eak Hour		Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	Location	Caltra	7 SB a On to Orano ns D12 2030 without	
Inputs					.1 .		*****		
Weaving nu	e-flow speed, a mber of lanes, g length, L (ft)		65 5 178 Lev		Weaving type Volume ratio Weaving ratio	, VR		A 0.1 0.1	
Conver	sions to p	c/h Unde	r Base C	ondition	S				
(pc/h)	٧	PHF	Truck %	RV %	E _T	E _R	fHV	fp	٧
Vo1	6940	0.95	6	0	1.5	1.2	0.971	1,00	7524
Vo2	10	0.95	6	0	1.5	1.2	0.971	1.00	10
Vw1	860	0.95	6	0	1.5	1.2	0.971	1.00	932
√w2	148	0.95	6	0	1.5	1.2	0.971	1.00	160
Vw		•		1092	Vnw			•	7534
√	1					ı			8626
Weavin	g and No	n-Weavin	g Speeds						.1
			Unconstr		-		Cons	trained	
		Weaving			ring (i = nw)	Weavin	g (i = w)	Non-Wea	ving (= nw
a (Exhibit 24		0.15		0.0					
c (Exhibit 24		2.20 0.97		4.0					
d (Exhibit 24		0.80		0.					····
Veaving intens		0.68		0.:					
Neaving and no	n-weaving	47.8		56.					
Maximum n	anes required to the same of t	for unconstrair , Nw (max)	ed operation,	Nw	1.20 1.40	if Nw > Nw	(max) constr	ained operati	on
	g Segmer	<u> </u>	<u> </u>				<u> </u>	•	
	gment speed,			55.06			7		
	gment density,	D (pc/mi/ln)		31.33					
_evel of ser				D					
	base condition			11099	,				
	a 15-minute fl		_	10776					
	a full-hour volu	ıme, c _h (veh/h)	10237		·		****	
Notes									
b. Capacity con: c. Capacity occi d. Three-lane Ty	ments longer than 2 strained by basic fre urs under constraine ope A segments do ne A segments do n	eeway capacity. ed operating condit not operate well at ot operate well at v	ions. volume ratios great	ater than 0.45. Poter than 0.35. Poo	oor operations and so or operations and so	some local queuir ome local queuinç	ng are expected in	such cases.	

- f. Capacity constrained by maximum allowable wearing flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

 h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

 j. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright © 2003 University of Florida, All Rights Reserved

			FREEVVA	Y WEAV	ING WOR				
Genera	Informat	ion	·		Site Info	rmation			
Analyst Agency/Col Date Perfor Analysis Til	med	07/14	Engineers /10 eak Hour		Freeway/Dir o Weaving Seg Jurisdiction Analysis Yea	Location	Caltra	7 SB a On to Orang ans D12 2030 without	-
Inputs								,	
Freeway fre Weaving nu Weaving se Terrain	e-flow speed, mber of lanes, g length, L (ft)	N `	65 5 178 Lev	rel	Weaving type Volume ratio, Weaving ratio	, VR		A 0.: 0.:	
(pc/h)	V V	PHF	Truck %	RV %	E _T	F	fHV	fp	Τ
Vo1	7750	0.95	6	 	1.5	E _R			V 0400
Vo2	30	0.95	6	0			0.971	1.00	8402
V02 Vw1	900	0.95	6	0	1.5	1.2	0.971	1.00	32
			<u> </u>	0	1.5	1.2	0.971	1.00	975
Vw2	396	0.95	6	0	1.5	1.2	0.971	1.00	429
Vw	4			1404	Vnw				8434
V									9838
Weavin	g and No	n-Weavin							
		Weaving	Unconstr	-	ina (i – aus)	16 for only		trained	
a (Exhibit 2	1-6)	0.13			ving (i = nw) .00	vveavii	ng (i = w)	Non-wea	ving (= nw)
b (Exhibit 2		2.20			.00		······································		
c (Exhibit 2		0.97			30				
d (Exhibit 2	1-6)	0.80)	0.	.75				
Weaving intens	<u> </u>	0.79)	0.	42				
Weaving and n speeds, Si (mi/	on-weaving	45.7	0	53	.81				
Number of I Maximum n	anes required umber of lanes	s, Nw (max)			1.32 1.40	if Nw > Nv	v (max) consti	rained operati	on
Weavin	g Segmer	nt Speed,	Density,	Level of	f Service,				
Weaving se	gment speed,	S (mi/h)		52.49					
	gment density,	D (pc/mi/ln)		37.49					
Level of ser				E.					
Capacity of	base condition	, c _b (pc/h)		10982					
Capacity as	a 15-minute fl	ow rate, c (vel	n/h)	10662					
Capacity as	a full-hour vol	ume, c _h (veh/h)	10129					
Notes									

- b. Capacity constrained by basic freeway capacity.
 c. Capacity occurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.
 i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

 $HCS2000^{\mathrm{TM}}$

Genera	l Informat				Site Info						
Analyst Agency/Co Date Perfor Analysis Ti	med	07/14	Engineers /10 eak Hour		Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	of Travel g Location	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2030 without Project				
Weaving no Weaving se Terrain	ee-flow speed, umber of lanes, eg length, L (ft)	N ` ′	65 5 213 Lev	el	Weaving type Volume ratio Weaving ratio	, VR		B 0. 0.			
	sions to p			ondition							
(pc/h)		PHF	Truck %	RV %	E _T	E _R	fhv	fp	V		
Vo1	4000	0.95	6	0	1.5	1.2	0.971	1.00	4336		
Vo2	10	0.95	6	0	1.5	1.2	0.971	1.00	10		
Vw1	900	0.95	6	0	1.5	1.2	0.971	1.00	975		
/w2	194	0.95	6	0	1.5	1.2	0.971	1.00	210		
/w				1185	Vnw		4346				
V						ı			5531		
Weavin	g and No	n-Weavin	g Speeds	3							
			Unconstr				Cons	trained			
		Weaving	(i = w)	Non-Weav	/ing (i = nw)	Weavin	ıg (i = w)	Non-Wea	ving (= nw		
a (Exhibit 2		0.08		0.							
(Exhibit 2		2.20		6.							
c (Exhibit 2 d (Exhibit 2		0.70		0.1	00				-		
Veaving intens		0.36		0.							
Neaving and n	on-weaving	55.4		62							
Maximum n	anes required to umber of lanes	for unconstrair , Nw (max) (max) uncons	ned operation, trained operati	Nw ion	1.08 3.50		ı (max) constr	ained operati	on		
	g Segmer		Density,		Service,	and Cap	acity				
	gment speed,			60.98							
	gment density,	บ (pc/mi/ln)		18.14							
evel of ser	vice, LOS base condition	o (no/h)		B	·····						
			<i>I</i> L\	11642							
	a 15-minute flo			11303			······································		_ ,		
	a full-hour volu	ine, ch (ven/n	1	10738							
 Capacity con Capacity occ Three-lane Ty Four-lane Tyy Capacity cons Five-lane Tyr 	ments longer than 2 strained by basic fre urs under constraine ype A segments do pe A segments do no strained by maximur te A segments do no ing segments do no	eway capacity. d operating condit not operate well at ot operate well at n allowable weavir ot operate well at v	tions. t volume ratios great volume ratios great ag flow rate: 2,800 volume ratios great	ater than 0.45. Po ter than 0.35. Poo pc/h (Type A), 4,0 er than 0.20. Poo	por operations and so or operations and so 000 (Type B), 3,500 or operations and so	some local queuir ome local queuinç (Type C). ome local queuing	ng are expected in g are expected in s are expected in s	such cases. such cases.			

			FREEVVA	TVEAV	ING WOF		<u> </u>				
General	Informat	ion			Site Info	rmation			· · · ·		
Analyst Agency/Con Date Perfort Analysis Tin	ned	07/14/	ngineers 10 eak Hour		Freeway/Dir Weaving Seq Jurisdiction Analysis Yea	g Location	Caltra	7 NB a On to Ball (ans D12 2030 without			
Inputs	•	· ·						-			
Freeway fre Weaving nu	e-flow speed, s mber of lanes, g length, L (ft)		65 5 213 Lev		Weaving type Volume ratio Weaving ratio	, VR			B 0.13 0.27		
Convers	sions to p	c/h Unde	r Base C	ondition	ıs						
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fHV	fp	V		
Vo1	8370	0.95	6	0	1.5	1.2	0.971	1.00	9074		
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32		
Vw1	950	0.95	6	0	1.5	1.2	0.971	1.00	1030		
Vw2	352	0.95	6	0	1.5	1.2	0.971	1.00	381		
Vw				1411	Vnw				9106		
V	7					•			10517		
Weaving	g and No	n-Weavin	g Speeds	 }					h		
``			Unconstr		trained						
		Weaving	(i = w)	Non-Weaving (i = nw) Weaving			g (i = w)	Non-Wea	ving (= nw)		
a (Exhibit 24		0.08		0.00				ļ			
b (Exhibit 24		2.20			00						
c (Exhibit 24 d (Exhibit 24		0.70 0.50		<u> </u>	00 50			 			
Weaving intensi		0.48			19						
Weaving and no	n-weaving	52.0			.06						
Maximum nu	anes required t umber of lanes	1 for unconstrair	ned operation,	Nw	0.64 3.50	if Nw > Nv	/ (max) const	rained operati	on		
		<u> </u>			f Service,			· ·			
	gment speed,			59.68							
	gment density,	D (pc/mi/ln)		35.25							
Level of serv				Е							
	base condition	•		11750							
		ow rate, c (veh		11408							
Capacity as	a full-hour volu	ume, c _h (veh/h)	10838							
Notes											
 a. Weaving segr 	nents longer than 2 strained by basic fre		as isolated merge	and diverge area	as using the proced	ures of Chapter 2	5, "Ramps and R	amp Junctions".			

- c. Capacity occurs under constrained operating conditions.
- c. Capacity occurs under constrained operating conditions.

 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

 h. Type B weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

 i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright @ 2003 University of Florida, All Rights Reserved

Canaral	Informat				Site Info		-					
General	imormai	1011			Site info	mation						
Analyst Agency/Con Date Perfon Analysis Tin	ned	07/14/	ingineers 110 eak Hour		Freeway/Dir o Weaving Seg Jurisdiction Analysis Year	Location	Caltra	7 SB On to Katella C Ins D12 2030 without l				
Inputs					<u> </u>							
Freeway fre Weaving nu Weaving se Terrain	e-flow speed, mber of lanes, g length, L (ft)	N	65 4 249 Lev	el	Weaving type Volume ratio, Weaving ratio	VR		B 0.18 0.42				
	sions to p	1					£	T	1			
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fHV	fp fp	V			
Vo1	6750	0.95	6	0	1.5	1.2	0.971	1.00	7318			
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32			
Vw1	882	0.95	6	0	1.5	1.2	0.971	1.00	956			
/w2	640	0.95	6	0	1.5 Vnw	1.2	0.971	1.00	693			
/w				1649		7350						
V	_								8999			
Weaving	g and No	n-Weavin										
		100	Unconstr		<u>.</u>		Cons ng (i = w)	trained				
a (Exhibit 24	I-6)	Weaving 0.08			ving (i = nw) 00	Non-Wea	ving (= nw)					
b (Exhibit 24		2.20			00							
c (Exhibit 24		0.70			00				,			
d (Exhibit 24		0.50			50							
Weaving intensi	•	0.52	2	0.	25							
Weaving and no speeds, Si (mi/h		51.2	9	59	.09							
Maximum nı	anes required tumber of lanes	, Nw (max)	•		0.67 3.50	if Nw > Nv	v (max) constr	rained operati	on			
		<u> </u>		y, Level of Service, and Capacity								
	gment speed,			57.49								
Veaving se	eaving segment density, D (pc/mi/ln)				39.13							
evel of sen				9400								
	apacity of base condition, c _b (pc/h)											
	pacity as a 15-minute flow rate, c (veh/h)											
Capacity as	oacity as a full-hour volume, c _h (veh/h)				8670							

- Capacity constrained by basic freeway capacity.
- apacity constrained by basic treeway capacity.
 Capacity occurs under constrained operating conditions.
 Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
 Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright @ 2003 University of Florida, All Rights Reserved

			FREEWA	Y WEAV	ING WOR	KSHEE	T				
Genera	Informat				Site Info						
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14/	ngineers 10 ak Hour		Freeway/Dir of Weaving Seg Jurisdiction Analysis Yea	Location	SR-57 SB Ball On to Katella Off Caltrans D12 Year 2030 without Project				
Weaving nu Weaving se Terrain	e-flow speed, s imber of lanes, g length, L (ft)	N .	65 4 249 Lev	el	Weaving type Volume ratio, Weaving ratio	VR		B 0. 0.			
	sions to p						T	<u> </u>	1		
(pc/h)	V	PHF	Truck %	RV %	Ε _Τ	ER	fhv	fp	٧		
Vo1	7010	0.95	6	0	1.5	1.2	0.971	1.00	7600		
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32		
Vw1	749	0.95	6	0	1.5	1.2	0.971	1.00	812		
Vw2	550	0.95	6	0	1.5	1.2	0.971	1.00	596		
Vw				1408	Vnw		7632				
V	1 .						9040				
Weavin	g and Nor	า-Weavin	g Speeds	<u> </u>							
			Unconstr				Cons	trained			
		Weaving		Non-Wea	ving (i = nw)	Weavir	ng (i = w)	Non-Wea	ving (= nw)		
a (Exhibit 2		0.08		0.00							
b (Exhibit 2		2.20		6.00				<u> </u>	 		
c (Exhibit 2		0.70			00			<u> </u>			
d (Exhibit 2 Weaving intens		0.50 0.49			50 22			<u> </u>			
Weaving and n								 			
speeds, Si (mi/l	1)	51.89		<u> </u>	.23			<u> </u>			
Maximum n	anes required fumber of lanes If Nw < Nw	, Nw (max)	•		0.55 3.50	≣ if Nlw > Nw	v (max) consti	rained onerati	On		
	g Segmer	<u> </u>						dinod oporae	-		
	gment speed, S		<i>-</i>	58.76			out on the second				
	gment density,			38.46					····		
Level of ser				E				WWW.7			
Capacity of	base condition	, c _h (pc/h)		9400							
Capacity as	a 15-minute flo	ow rate, c (veh	/h)	9126							
	a full-hour volu	•	•	8670							
Notes		11 '		<u> </u>							
a. Weaving seg b. Capacity con c. Capacity occ d. Three-lane T e. Four-lane Ty f. Capacity cons g. Five-lane Ty h. Type B weav	ments longer than 2 strained by basic fre urs under constraine ype A segments do pe A segments do no strained by maximur e A segments do no ing segments do no	eway capacity. ed operating condit not operate well at ot operate well at n allowable weavin ot operate well at v t operate well at v	ions. volume ratios greated the	ater than 0.45. Poter than 0.35. Popc/h (Type A), 4, ter than 0.20. Poter than 0.80. Poo	oor operations and so or operations and so 000 (Type B), 3,500 or operations and so	some local queui ome local queuin (Type C). ome local queuing me local queuing	ng are expected in g are expected in g are expected in a are expected in s	n such cases. such cases. such cases. uch cases.			

Copyright © 2003 University of Florida, All Rights Reserved

APPENDIX Q-II

YEAR 2030 WITH PROJECT TRAFFIC CONDITIONS –
CALTRANS FREEWAY RAMP ANALYSIS (HCM
METHODOLOGY)

MERGE/DIVERGE ANALYSIS

		RAMP	SAND	RAMI	P JUN	CTIONS	S WC	ORKS	HE	a r		····	
General	Informat					Site In:							
Analyst2		ZS			F	reeway/Dir				5 NB	· ·		
Agency or Co		LLG Engi	neers		Ju	ınction					at Katella		
Date Perform Analysis Time		07/14/10 AM Peak	Hour			urisdiction	_			altrans D			
	iption AM Y			5 NR On-	Ramp at	nalysis Yea	<u>r</u>		Y	ear 2030	with Project		
Inputs	puon 7 min	Cai 2000 Wa	TOJCCE	J ND OIL	ramp at	ratella						***	
,		Terrain Leve	<u> </u>								T	II :	
Upstream Adj	Ramp		•								1	ım Adj Ramp	
Yes	☑ On										Yes	M On	
No No	I Off										I No	■ Off	
-up =	1400 ft										L _{down} =	ft	
Vu =	370 veh/h	\$	S _{FF} = 70					35.0 mp	h		VD =	veh/h	
						es, L _A , L _D ,V	$_{R}$, V_{f})						
Convers	ion to pc	/h Under	Base	Condi	tions	5							
(pc/h)	V (Veh/hr)	PHF	Ten	rain	Truck	%Rv	1	ΗV		fp	v=V/PHF f	_{tV} ^f p	
Freeway	5230	0.95 0.95	Lev	el	9	0	0.9	57		1.00	5753		
Ramp	260	9	0.	0.9			1.00	286					
UpStream	370	9	0	0.9	57		1.00	407					
DownStream	71	Merge Areas							Dive	A			
Estimatio	on of V ₁₂	Weige Aleas				Estima	tion	of v		ge Areas	5		
		12 = V _F (P _{FM})								/ _R + (V _F -	V VD		
= /Eau	ation 25-2 or 2		!			/					[™] R ^{/™} FD		
		•				L _{EQ} = (Eq			20-9)			
	using Equatio	n 4				1 '-	ing Eq	uation					
/ ₁₂ = 1964		ж				V ₁₂ = pc/							
Capacity	Checks				:	Capaci	ty C	heck	S				
_	Actua	l Max	mum	LOS	F?			Actua	al	Max	ximum	LOS F?	
V	0000	Car F	alu or z	.,		V _{FI} =V _F				See Ex	hibit 25-14		
V _{FO}	6039	See Ext	nibit 25-7	No)	V ₁₂				44	00:All	,	
V _{R12}	2250	460	0:All	No	,	$V_{FO} = V_{F}$ V_{R}	-		,	See Ex	hibit 25-14		
			;			V _R				See Ex	chibit 25-3		
Level of	Service E	etermina	ation (i	f not F	=)	Level o	f Se	rvice	De	termir	nation (if	not F)	
$D_R = 5$.475 + 0.0073	4 v _R + 0.007	8 V ₁₂ - 0.0	00627 L _A			D	R = 4.25	2 + 0	.0086 V ₁	₂ - 0.009 L _D		
O _R = 19.8		D _R = (pc/ m/ln)											
.OS = B (E	xhibit 25-4)					LOS= (Exhibit 25-4)							
Speed Es	timation					Speed Estimation							
$M_{\rm S} = 0.32$	23 (Exibit 25-	19)		****		D _s = (Exhibit 25-19)							
_	mph (Exhibi	•			1	S _R = mph (Exhibit 25-19)							
								S ₀ = mph (Exhibit 25-19)					
	mph (Exhibi	•				S = mph (Exhibit 25-15)							
oTM	(-2000)	· · · /			1	S = mpn (Exhibit 25-15)							

Copyright © 2000 University of Florida, All Rights Reserved

	 	RAMP	S AND	RAM	P JUN	CTIONS	s Wo	ORKSI	IEET			
General	Informati					Site In						
Analyst2 Agency or Co Date Perform Analysis Tim	ompany ned	ZS LLG Engi 07/14/10 PM Peak	Ноиг	-5 NR On	Ju Ju Ai	reeway/Dir Inction Irisdiction nalysis Yea	of Trav		Caltrans	p at Katella D12 30 With Project		
Inputs	npuon inin	2030 VVIII	r rojecti	O IND OIL	-itallip at	Natella					·	
Upstream Ad		Terrain Leve	1					···		Downstrea	ım Adj Ramp	
☑ Yes	☑ On									☐ Yes ☑ No	∭ On ∭ Off	
I No	Off	·								L _{down} =	t∰ Oli ft	
L _{up} =	1400 ft											
	570 veh/h			Sketch (es, L _A , L _D ,V	111	35.0 mph		VD =	veh/h	
Convers	ion to pc/	h Under	Base	Condi	tions							
(pc/h)	V (Veh/hr)	PHF	Ter		Truck	%Rv		f _{HV}	f _p	v=V/PHF f	_{HV} f _p	
Freeway	8290 410	0.95	Lev		9	0		957	1.00	9119		
Ramp UpStream	570	0.95 0.95	Lev Lev	•	9	0	+	957 957	1.00 1.00	451 627		
DownStream		0.33	LEV	CI	-	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	0.3	937	1.00	021		
		Merge Areas	;		1		<u>. </u>		iverge Are	eas		
Estimation	on of v ₁₂					Estima	tion	of v	,			
	ation 25-2 or 2 using Equation	=				L _{EQ} = (Ed P _{FD} = us V ₁₂ = pc/	ing Eq	25-8 or 2		(_F - V _R)P _{FD}		
Capacity	Checks					Capaci	ty C	hecks				
e*	Actual	Max	imum	LOS	S F?			Actual	N	/laximum	LOS F?	
						V _{FI} =V _I	_		See	Exhibit 25-14		
V _{FO}	9570	See Ext	nibit 25-7	No	0	V ₁₂				4400:All		
V _{R12}	3376	460	0:All	No	o	$V_{FO} = V_{F}$ V_{R}	-		See I	Exhibit 25-14		
						V_R			See	Exhibit 25-3		
Level of	Service D	etermina	ation (i	if not l	5)	Level o	of Se	rvice	Determ	ination (if	not F)	
D _R = 5			C	_R = 4.252	+ 0.0086	V ₁₂ - 0.009 L _D						
$D_R = 28.5$	5 (pc/ m/ln)					D _R = ((pc/ m/	'ln)		2		
LOS = D (I	Exhibit 25-4)					LOS= (Exhibit 25-4)						
Speed Es	stimation					Speed Estimation						
·	00 (Exibit 25-	19)				D _s = (Exhibit 25-19)						
••	8 mph (Exhibit	•				S _R = mph (Exhibit 25-19)						
-	7 mph (Exhibit 7 mph (Exhibit		S ₀ = mph (Exhibit 25-19)									
J JU.,	TUPIT (CARIDII	20-17)				S = mph (Exhibit 25-15)						

Copyright © 2000 University of Florida, All Rights Reserved

	RAMPS AND RAMP JUNCTIONS WORKSHEET Eneral Information Site Information Playst ZS Freeway/Dir of Travel I-5 SB											
General Info	rmation			Sit	e Infori	mation						
Analyst	***	ZS			Fre	eway/Dir	of Tr	avel	I-5 SB			
Agency or Co	mpany	LLG Eng	ineers		Jur	ection				mp at Kate	lla	
Date Performe	ed	07/14/10			Jur	isdiction			Caltran	s D12		
Analysis Time	Period	AM Peak	Hour		Ana	alysis Yea	ar		Year 2	030 With P	roject	
Project Descri	iption AM	Year 2030	With I	Project I-	5 SB O	ff-Ramp a	at Kat	tella				
Inputs												
Upstream Adj		Terrain Le	vel							Downstr Ramp	eam Adj	
I Yes ■	On									I≣ Yes	□ On	
□ No □	Off									I▼ No		
L _{up} = 11	30 ft	S		70.0 mph	··		: =	35.0 m	nnh	Ldown =	ft	
Vu = 73	0 veh/h	١	• •						ıbıı.	VD =	veh/h	
					now lan	ies, L _A , L	D, V _R ,	ν _f)				
Conversion t		der Base C	onditi	ons		 		I		v=V/PHI		
(pc/h)	V (Veh/hr)	PHF	Те	rrain	Truck	%Rv	f	HV	f _p	f _{HV} f _p		
Freeway	6230	0.95	Le	vel	9	0	0.9	57	1.00			
Ramp	940	0.95	Le	vel	9	0	0.9	57	1.00	1034		
UpStream	730	0.95	Le	vel	9	0	0.9	57	1.00	803		
DownStream								Ī	•			
	Me	erge Areas						D	iverge A	reas		
Estimation o	f V ₁₂					Estimati	ion o	f V ₁₂				
		= V _F (P _{FM})						V ₁₂	= V _D + (V _F - V _R)P _{FD}		
L _{EQ} = (Equat						L _{EC} = (F	duati		or 25-9		•	
·		20 0)										
P _{FM} = using E	-quau011					$P_{FD} = 0.260$ using Equation 0 $V_{12} = 2280$ pc/h						
V ₁₂ = pc/h										•		
Capacity Che		1			F0.	Capacit	y Che				100.50	
	Actual	Maxim	num	LOS	⊢ ?			Actual		aximum	LOS F?	
V		See Exh	bit 25-			V _{FI} =V _F	=	5826		9600	No	
V _{FO}		7				V ₁₂		2280	4	400:All	No	
V _{R12}		4600	·All			$V_{FO} = V_1$ V_R	F -	4792	9	9600	No	
*R12		7,000	. 41		ŀ	V _R		1034		3800	No	
Level of Serv	ice Deteri	nination (i	not F	<u> </u>			Serv	rice De	termina	tion (if not i	F)	
$D_{p} = 5.475$					L.		_			6 V ₁₂ - 0.00		
'`	ni /ln)		- A	D _R =		pc/ mi /		14	<i>U</i> .			
LOS = (Exhi	bit 25-4)					LOS= A (Exhibit 25-4)						
Speed Estim	-					Speed Estimation						
	it 25-19)	•				$D_s = 0.521$ (Exhibit 25-19)						
	=	: 40)				S _R = 55.4 mph (Exhibit 25-19)						
	(Exhibit 25					S ₀ = 73.8 mph (Exhibit 25-19)						
1 1	(Exhibit 25	-										
S= mph	(Exhibit 25	5-14)				S = 65.3 mph (Exhibit 25-15)						
o o o TM						ity of Florida All Rights Reserved						

Copyright © 2000 University of Florida, All Rights Reserved

	RAMPS AND RAMP JUNCTIONS WORKSHEET eneral Information alyst ZS Freeway/Dir of Travel I-5 SB												
	rmation	~~		Sit									
Analyst		ZS				_	r of	Travel	I-5			_ 	
Agency or Co		LLG Eng		5		nction					p at Katel	la	
Date Perform		07/14/10				risdiction				trans !			
Analysis Time		PM Peak				alysis Ye			Yea	ar 203	0 With P	oject	
Project Descr	iption PM	Year 2030) With	Project I-	-5 SB O	ff-Ramp :	at K	atella					
<i>Inputs</i> Upstream Adj	Ramp	Terrain Le	evel			* · 3 · · 3 · · 3				-	Downstre	eam Adj	
✓ Yes	On										Ramp	-	
I No ⊠	Off										☐ Yes ☑ No		
											L	∭ Off ft	
L _{up} = 11	30 ft	S	= ·	70.0 mph	<u></u>	9	· :	= 35.0	mph		L _{down} =	IL	
Vu = 59	0 veh/h	·				ies, L _A , L			inpa		VD =	veh/h	
Conversion t	i	lor Basa (TIOW IAI	ics, L _A , L	Dי V	R ^{, V} f)			<u> </u>		
	o pe/ii one ∨		JUNUIL	UIIS					Fuv f		v=V/PHF		
(pc/h)	(Veh/hr)	PHF	Те	rrain	Truck	%Rv		f _{HV}	,	f _p	f _{HV} f _p		
Freeway	7770	0.95	Le	vel	9	0	0	957 1.00			8547		
Ramp	410	0.95	Le	vel	9	0	0	0.957 1.00			451		
UpStream	590	0.95	Le	vel	9	0	0	.957	1.0	00	649		
DownStream													
		rge Areas							Diverg	e Area	ıs		
Estimation of	r v ₁₂					Estimati	on	of v ₁₂					
	V ₁₂ =	V _F (P _{FM})						V_1	₂ = V _R	+ (V _F	- V _R)P _{FD}		
L _{EQ} = (Equat	ion 25-2 or	25-3)		•		L _{EQ} = (E	qua	tion 25-	8 or 2	5-9)	- · •		
P _{FM} = using E	quation					P _{FD} =0.260 using Equation 0							
V ₁₂ = pc/h						$V_{12} = 2112 \text{ pc/h}$							
Capacity Che	cks					Capacity					****		
	Actual	Maxim	um	LOS	F?	oupuon)	1	Actua	1	Maxii	mum	LOS F?	
						V _{Fi} =V _F	╗	6838		96		No	
V _{FO}		See Exhi	DIL 20-		 	V ₁₂		2112	+	4400		No	
V _{R12}		4600	All			$V_{FO} = V_{F}$ V_{R}		6387		960		No	
17.12					t	V _R	_	451		380	0	No	
Level of Serv	ice Determ	ination (it	not F)			Sei	rvice De	termi	nation	(if not F)		
D _R = 5.475 +											12 - 0.009		
D _R = (pc/ m		^	D _R =	•	(pc/ mi /			16	D				
LOS = (Exhib	oit 25-4)		LOS= ,	A (I	Exhibit 2	(5-4)							
Speed Estima	ation					Speed Estimation							
M _s = (Exibi	t 25-19)	•				D _s = (0.46	69 (Exhi	bit 25	-19)			
_	(Exhibit 25-	19)				S _R = 56.9 mph (Exhibit 25-19)							
-	Exhibit 25-	-						5 mph (-	•	
	(Exhibit 25-		_		-			-					
- mpm		• 7)				S = 66.2 mph (Exhibit 25-15)							

Copyright © 2000 University of Florida, All Rights Reserved

		RAMP	S AND	RAM	P JUN	CTIONS	S WC	RKSHE	ET	**	
General	Informati	ion				Site In:	form	ation			
Analyst2 Agency or C Date Perforn Analysis Tim Project Desc	ned	ZS LLG Eng 07/14/10 AM Peak ear 2030 Witl	Hour	SR-57 NB	յն Ju A	reeway/Dir of unction urisdiction nalysis Yea damp at Kate	Г	E	Caltrans E	ımp at Katella	
Inputs											
Upstream Ad	tj Ramp	Terrain Leve	el							Downstrea	ım Adj Ramp
T Yes	I≣ On									✓ Yes	₩ On
I No	I≣ Off									I No =	₩ Off 1090 ft
L _{up} =	ft									L _{down} =	1030 II
Vu =	veh/h		S _{FF} = 70	Sketch (es, L _A , L _D ,V		35.0 mph		VD =	240 veh/h
Convers	ion to pc	/h Under	Base	Condi	tions			······			
(pc/h)	(Veh/hr)	PHF	Ter		Truck	%Rv		н	f _p	_{HV} f _p	
Freeway Ramp	4350 400	0.95 0.95	Le\ Le\		6	0	0.9 0.9		1.00	4716 434	·
UpStream	100	0.00	LC	CI :	<u> </u>	<u> </u>	0.9	/ 	1.00	434	
DownStream	240	0.95	Lev	el	6	0	0.9	71	1.00	260	
		Merge Areas	3						rge Area	S	
Estimati	on of v ₁₂					Estima	tion	of v ₁₂			
P _{FM} = 0.323 V ₁₂ = 1188	ation 25-2 or 2 using Equatio pc/h)			P _{FD} = usi V ₁₂ = pc/l	ing Equ h	25-8 or 25-9 Jation	V _R + (V _F 9)	- V _R)P _{FD}	·
Capacity	/ Checks					Capaci	ty Cl	hecks			
	Actua	l Max	imum	LOS	F?			Actual	Ma	ximum	LOS F?
V_{FO}	4113	See Evi	nibit 25-7	No	,	V _{FI} =V _F	:		See Ex	hibit 25-14	
*F0	7110	JOGG LA	HUIL 25-1	INC	,	V ₁₂			44	-00:All	
V _{R12}	1622	460	0:All	No)	$V_{FO} = V_{F}$ V_{R}				hibit 25-14	
						V _R				xhibit 25-3	
	Service E				5)	Level o				nation (ii	not F)
D _R = 8		D _R = (1	D	_R = 4.252 + (0.0086 V ₁	₁₂ - 0.009 L _D					
**								n)	•		
	Exhibit 25-4)		. ,			LOS= (Exhibit 25-4)					
Speed E	stimation					Speed Estimation					
$M_{S} = 0.3$	06 (Exibit 25-	19)				D _s = (Exhibit 25-19)					
S _R = 61.	4 mph (Exhibi	t 25-19)				S _R = mph (Exhibit 25-19)					
•	3 mph (Exhibit	-				S ₀ = mph (Exhibit 25-19)					
S= 64.5	9 mph (Exhibit	t 25-14)				S = mph (Exhibit 25-15)					

Copyright © 2000 University of Florida, All Rights Reserved

		RAMF	S AND	RAM	P JUN	CTION	s W	ORK	SHE	ET		
	Informat	ion				Site In						
Analyst2 Agency or Co	ompany	ZS LLG Eng	ineers			reeway/Dir unction	of Tra	ivel		R-57 NE	3 amp at Katella	
Date Perform	ned	07/14/10	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			urisdiction				altrans [1
Analysis Time		PM Peak	Hour		A	nalysis Yea	ır	-			With Project	·
	ription PM Y	ear 2030 Wit	n Project S	SR-57 NB	EB On-F	Ramp at Kal	lella					
nputs												
Jpstream Ad	j Ramp	Terrain Leve	el								Downstrea	ım Adj Ramp
Tes Yes	I On										Yes	☑ On
⊠ No	□ Off										∭ No	I≣ Off
-up =	ft			<u></u>							L _{down} =	1090 ft
/u =	veh/h	;	S _{FF} = 70			$S_{FR} = 35.0 \text{ mph}$ $V_D = 520 \text{ ve}$						
						lanes, L _A , L _D ,V _R ,V _f)						
Convers	ion to pc	h Under	Base	Condi	tions	s						
(pc/h)	V (Veh/hr)	PHF	Ter	rain	Truck	%Rv		f _{HV} .		f _ρ	v=V/PHF f	ıv ^f p
Freeway	8410	0.95 0.95	6	0	0.	971		1.00	9118			
Ramp	500	6	0	0.	971		1.00	542				
UpStream DownStream	520	0.95			_	074						
Downoucam		Merge Areas	Lev	ei	6	0	0.	971		1.00	564	
Estimatio	on of v ₁₂	11101 go 1 110 de				Estima	tion	of v	DIVE.	ge Area	S	
	٧.	= V _F (P _{FM})		· · · · · · · · · · · · · · · · · · ·						/_ + (V	- V _R)P _{FD}	
_{EO} = (Equa	ation 25-2 or 2					L _{EQ} = (Eq	uatio				'K/' FD	
	using Equation	•				P _{FD} = usi			. 200	i		
/ ₁₂ = 2047						rd us V ₁₂ = pc/		faranon				
Capacity		·		_				hac!				
Jupuorty		Movi		1.00) F0	Capaci	ty C					
	Actual	IVIAXI	mum	LOS	5 F ?			Actu	al		ximum	LOS F?
V_{FO}	7160	See Ext	ibit 25-7	No	,	V _{FI} =V _F				See Ex	hibit 25-14	
						V ₁₂				44	00:All	
V _{R12}	2589	460	D:All	No	,	$V_{FO} = V_{F}$	-			See Ex	hibit 25-14	
						V _R See Exhibit 25-3						
evel of S	Service D	etermina	ition (i	f not F	9	Level o	f Se	rvice	De	termir	nation (if	not F)
D _R = 5.	475 + 0.0073	4 v _R + 0.0078	3 V ₁₂ - 0.0	0627 L _A							₂ - 0.009 L _D	······································
_R = 22.3	(pc/ m/ln)				į.	D _R = (oc/ m/			,	2 0	
OS = C (E	xhibit 25-4)				3			, t 25-4)				
	timation	····	****	*		Speed Estimation						
		0)	 -	-								
- ,	8 (Exibit 25-1	•				D _s = (Exhibit 25-19)						
•	mph (Exhibit	•				S _R = mph (Exhibit 25-19)						
_ ^^ ^												
-	mph (Exhibit mph (Exhibit	•				-		Exhibit 2 Exhibit 2	_			

 $HCS2000^{TM}$

Copyright @ 2000 University of Florida, All Rights Reserved

		RAMP	S AND	RAM	P JUN	CTIONS	W	ORKS	HE	ΕT		
General	Informati	on	···			Site In	forn	natio	7			
Analyst2 Agency or Co Date Perform Analysis Time Project Descr	ed Period	ZS LLG Engli 07/14/10 AM Peak ear 2030 With	Hour	:R-57 SB	Ju Ju Ar	eeway/Dir on the control of the cont	r	vel	C	altrans D	mp at Katella 12 With Project	1
Inputs					·	·						
Upstream Adj	Ramp	Terrain Leve									Downstrea	m Adj Ramp
∭ Yes	I≣ On									e ^e	☑ Yes	☑ On
☑ No	 Off										I≣ No -	1015 ft
L _{up} =	ft		- 70	0 mnh		-	· <u> </u>	25 O m	n h		L _{down} =	
	veh/h			Sketch (es, L _A , L _D ,V	111	35.0 m	μπ		VD =	180 veh/h
Convers	ion to pc	/h Under	Base	Condi	tions				· · · · · · · · · · · · · · · · · · ·		· ,	* •
(pc/h)	V (Veh/hr)	PHF	Ter		Truck	%Rv	1	f _{HV}		f _p	ıv ^f p	
Freeway	7390	0.95 0.95	Lev Lev		6	0	-	971		1.00		
Ramp UpStream	260	6	0	U.	971	<u> </u>	1.00					
DownStream	180	0.95	Lev	el	6	0	0	971	 	1.00	195	
Dominoudum	100	Merge Areas		0.	<u> </u>	Ť	<u> </u>	07.		rge Areas		
Estimation	on of V ₁₂	.				Estima	tion	of v		- V		
L _{EQ} = (Equa P _{FM} = 0.342 V ₁₂ = 2739	ation 25-2 or 2 using Equatio	-)			L _{EQ} = (Ec P _{FD} = us V ₁₂ = pc/	ing E	n 25-8 o		V _R + (V _F -))	V _R)P _{FD}	
Capacity	Checks					Capaci	ty C	heck	S			·
	Actua	l Max	imum	LOS	3 F?			Actu	ıaİ	Max	dimum	LOS F?
V	0004	0 5-1	L:L:: 0C 7			V _{F1} =V _F	=			See Exi	nibit 25-14	
V _{FO}	8294	See Ex	hibit 25-7	N	0	V ₁₂				440	00:All	
V _{R12}	3021	460	0:All	No	0	$V_{FO} = V_{F}$ V_{R}	-		:		nibit 25-14	
						V _R				<u> </u>	hibit 25-3	
Level of					<u>F) </u>	Level o					nation (if	not F)
,,	$D_R = 5.475 + 0.00734 \text{ v}_R + 0.0078 \text{ V}_{12} - 0.00627 \text{ L}_A$								52 + (0.0086 V ₁	₂ - 0.009 L _D	
D _R = 25.8	_R = 25.8 (pc/ m/ln)							/ln)				
LOS = C(E	Exhibit 25-4)					LOS= (Exhibit 25-4)						
Speed Es	peed Estimation							imati	on			
ľ	66 (Exibit 25		D _s = (Exhibit 25-19)									
	8 mph (Exhib				:	S _R = mph (Exhibit 25-19)					-	
· ·	5 mph (Exhib	•				S ₀ = mph (Exhibit 25-19)						
S= 60.8	3 mph (Exhib	t 25-14)				S = mph (Exhibit 25-15)						

		RAMP	S AND	RAMI	P JUN	CTIONS	W	ORKS	HE	ET		
General	Informati	on				Site In:	forn	natior	1			
Analyst2 Agency or Co Date Perform Analysis Tim Project Desc	ied	ZS LLG Engi 07/14/10 PM Peak ear 2030 With	Hour	R-57 SB	Ju Ju Aı	eeway/Dir o Inction Irisdiction nalysis Yea Ramp at Kat	r	vel	C	altrans D1	mp at Katella I2 With Project	
Inputs												
Upstream Ad	j Ramp	Terrain Leve	el								Downstrea	m Adj Ramp
Yes Yes	I™ On										Yes	₩ On
l▼ No	I⊞ Off										No L _{down} =	•
L _{up} =	ft						•				down	
Vu =	veh/h	:	S _{FF} = 70		show lane	es, L _A , L _D ,V	, , ,	35.0 m _l	ph		VD =	510 veh/h
Convers	ion to pc	h Under	Base	Condi	tions							
(pc/h)	V (Veh/hr)	PHF	Ter		Truck	%Rv	ļ	f _{HV}		f _p	v≃V/PHF f _i	√V ^f p
Freeway	7570	0.95	Lev		6	. 0	+	971	_	1.00	8207	
Ramp UpStream	510	0.95	Lev	el	6	0	0.	971		1.00	553	
DownStream	510	0.95	Lev	rel	6	0	0	971		1.00	553	
	1	Merge Areas			l		<u> </u>	· · ·		rge Areas		
Estimati	on of v ₁₂	_				Estima	tior	of v	12			
	ation 25-2 or 2 using Equatio)			L _{EQ} = (Ed P _{FD} = us V ₁₂ = pc/	ing E	n 25-8 o		/ _R + (V _F -))	V _R)P _{FD}	
Capacity	Checks					Capaci	ity C	heck	S			
	Actua	I Max	imum	LOS	S F?			Actu	al	Max	dmum	LOS F?
V	8760	Con Fu	L:L:1 0E 7	k t	_	V _{FI} =V _F	F			See Ext	nibit 25-14	
V _{FO}	0/60	See Ex	hibit 25-7	No	U	V ₁₂				44(0:Ali	
V _{R12}	3080	460	O:All	No	0	V _{FO} = V _F V _R	-				nibit 25-14	
						V _R					hibit 25-3	
	Service E				<u>5) </u>	Level o					ation (it	not F)
D _R = 9		D _R = (52 + ().0086 V ₁ ;	₂ - 0.009 L _D					
••								/ln)				
							LOS= (Exhibit 25-4)					:
Speed E	peed Estimation							imatic	on			
M _S = 0.3	s = 0.371 (Exibit 25-19)							bit 25-19	9)			
	6 mph (Exhibi	t 25-19)				S _R = mph (Exhibit 25-19)						
	2 mph (Exhibi	t 25-19)				S ₀ = mph (Exhibit 25-19)					ĺ	
	0 mph (Exhibi	t 25-14)				S = mph (Exhibit 25-15)						

Copyright © 2000 University of Florida, All Rights Reserved

WEAVING ANALYSIS

			FREEWA	Y WEAV	ING WOR						
Genera	Informat	ion			Site Info	rmation			.		
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14/	ngineers 10 ak Hour	****	Freeway/Dir of Weaving Seg Jurisdiction Analysis Year	Location	SR-57 NB Orangewood On to Katella Of Caltrans D12 Year 2030 With Project				
Inputs											
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 1360 Terrain Leve				INICAVING PAILO R			B 0.24 0.25				
Conver	sions to p	c/h Unde	r Base C	ondition	S						
(pc/h)	V	PHF	Truck %	RV %	E _T	ER	fHV	fp	ν		
Vo1	4030	0.95	6	0	1.5	1.2	0.971	1.00	4369		
Vo2	20	0.95	6	0	1.5	1.2	0.971	1.00	21		
Vw1	950	0.95	6	0	1.5	1.2	0.971	1.00	1030		
Vw2	320	0.95	· 6	0	1.5	1.2	0.971	1.00	346		
Vw				1376	Vnw				4390		
v	/								5766		
Weavin	g and Nor	n-Weavin	g Speeds								
			Unconstr				Cons	Constrained			
		Weaving	(i = w)				ig (i = w)	Non-Wea	ving (= nw		
a (Exhibit 2		0.08		0.00			·				
b (Exhibit 2		2.20		6.1							
c (Exhibit 2 d (Exhibit 2		0.70 0.50		1.00				1			
Weaving intens		0.30		0.50							
Weaving and n	on-weaving	52.0		59.87				1	·		
speeds, Si (mi/		I			1.43						
Maximum n	anes required fumber of lanes If Nw < Nw	, Nw (max)	•		3.50	if Nw > Nv	v (max) const	rained operati	on		
Weavin	g Segmer	nt Speed,	Density,	Level of	Service,	and Cap	acity				
	gment speed,			57.80							
	gment density,	D (pc/mi/ln)		19.95							
Level of ser		- (II-)		B							
	base condition		4 3	11341							
	a 15-minute fl	•		11011							
	a full-hour voli	ume, c _h (ven/r	.)	10460							
b. Capacity cor c. Capacity occ d. Three-lane T e. Four-lane Ty f. Capacity con a. Five-lane Tv	ments longer than a strained by basic for urs under constrain ype A segments do rpe A segments do r strained by maximul pe A segments do no ving segments do no	eeway capacity. ed operating condi not operate well a not operate well at m allowable weavin ot operate well at	tions. t volume ratios gre volume ratios grea ng flow rate: 2,800 volume ratios grea	ater than 0.45. P ter than 0.35. Po pc/h (Type A), 4, ter than 0.20. Po	oor operations and or operations and s 000 (Type B), 3,500 or operations and s	some local queui ome local queuin O (Type C). ome local queuin	ing are expected in g are expected in g are expected in	n such cases. such cases. such cases.			

 $HCS2000^{\mathrm{TM}}$

Copyright © 2003 University of Florida, All Rights Reserved

			FREEWA	Y WEAV	ING WOR	KSHEE	T				
Genera	l Informat	ion			Site Info	rmation					
Analyst ZS Agency/Company LLG Engineers Date Performed 07/14/10 Analysis Time Period PM Peak Hour				Weaving Seg Jurisdiction	Freeway/Dir of Travel Weaving Seg Location Jurisdiction Analysis Year		SR-57 NB Orangewood On to Katella Off Caltrans D12 Year 2030 With Project				
Inputs					· 1						
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 1360 Terrain Leve Conversions to pc/h Under Base Co				el	Weaving type Volume ratio Weaving ratio	B 0.15 0.47					
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fHV	fp	l v		
Vo1	7750	0.95	6	 	1.5	1.2	0.971	1.00	8402		
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32		
V02 Vw1	740	0.95	6	0	1.5	1.2	0.971	1.00	802		
Vw2	660	0.95	6	0	1.5	1.2	0.971	1.00	715		
Vw		1 0.00	<u> </u>	1517	Vnw	114-	1 0.01 1	1 1.00	8434		
V			1011 1111					9951			
•	ng and No	n-Weavir	a Speeds						1 0001		
Weaving and Non-Weaving Speeds Unconstri							Constrained				
	Weaving (i = w)		(i = w)	Non-Weaving (i = nw)		Weavir	ng (i = w)	Non-Wea	ving (= nw		
a (Exhibit 2			0.08		0.00						
b (Exhibit 2		2.20 0.70		6.00							
c (Exhibit 2 d (Exhibit 2		0.70		0.50							
Weaving inten		0.6			25			 			
Weaving and a		49.2	9	58	3.90						
Number of	lanes required number of lanes	s, Nw (max)	·		0.96 3.50	if Nw > Nv	v (max) consti	rained operat	ion		
Weavir	ıg Segmer	nt Speed	Density,		f Service,	and Cap	acity				
	egment speed,			57.20							
	egment density,	D (pc/mi/ln)		34.79							
	rvice, LOS f base condition	c (nc/h)	···	D							
	s a 15-minute fl		h/h)	11582 11245							
	s a ro-minute ii s a full-hour voli		-	10683							
Notes		B (1				····-			
a. Weaving se b. Capacity co c. Capacity oc d. Three-lane T e. Four-lane T f. Capacity cor g. Five-lane T h. Type B wea	gments longer than a nstrained by basic for curs under constrain Type A segments do ype A segments do n strained by maximun ype A segments do no ving segments do no ving segments do no	eeway capacity. ed operating cond not operate well a not operate well at m allowable weava tot operate well at of operate well at	itions. at volume ratios grea volume ratios grea ng flow rate: 2,800 volume ratios great colume ratios great	eater than 0.45. Pater than 0.35. Po pc/h (Type A), 4 ter than 0.20. Po er than 0.80. Poo	oor operations and so operations and so 0,000 (Type B), 3,500 or operations and so operations and so	some local queu ome local queuin O (Type C). ome local queuin me local queuing	ing are expected in g are expected in g are expected in s are expected in s	n such cases. such cases. such cases. uch cases.			

Copyright © 2003 University of Florida, All Rights Reserved

Genera	Informat	tion	FREEWA		Site Info						
Genera	illioillia	LIOII			Site into	rmation					
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14	Engineers /10 eak Hour		Freeway/Dir of Travel Weaving Seg Location Jurisdiction Analysis Year		SR-57 SB Katella On to Orangewood Of Caltrans D12 Year 2030 With Project				
Inputs		·	· · · · · · · · · · · · · · · · · · ·		-I						
Freeway fre Weaving nu	e-flow speed, mber of lanes, g length, L (ft)		65 5 178 Lev		Weaving type Volume ratio, VR Weaving ratio, R			A 0.13 0.16			
Conver	sions to p	oc/h Unde	er Base C	ondition	s						
(pc/h)	٧	PHF	Truck %	RV %	E _T	E _R	fHV	fp	v		
Vo1	6940	0.95	6	0	1.5	1.2	0.971	1.00	7524		
Vo2	10	0.95	6	0	1.5	1.2	0.971	1.00	10		
Vw1	860	0.95	6	0	1.5	1.2	0.971	1.00	932		
Vw2	170	0.95	6	0	1.5	1.2	0.971	1.00	184		
Vw			•	1116	Vnw				7534		
v	/ 					l			8650		
Weavin	g and No	n-Weavin	g Speeds								
			Unconstr				Cons	trained			
Weaving (i = w)				Non-Weav	/ing (i = nw)	Weavin	g (i = w)	Non-Wea	ving (= nw		
a (Exhibit 24		0.18		0.0							
b (Exhibit 24 c (Exhibit 24		2.20		4.00							
d (Exhibit 24		0.97		1.30 0.75							
Neaving intensi		0.68		0.75							
Veaving and no	n-weaving	47.7		56.16							
Maximum n	anes required to umber of lanes If Nw < Nw	for unconstrain , Nw (max)	ned operation,	Nw	1.22 1.40	if Nw > Nw	(max) constr	ained operati	on		
Weaving	g Segmer	ıt Speed,	Density,	Level of	Service,						
	gment speed,			54.91							
	gment density,	D (pc/mi/ln)		31.50							
_evel of sen				D							
	base condition			11081							
	a 15-minute flo			10758							
	a full-hour volu	ıme, c _h (veh/h)	10220							
Capacity cons Capacity occu Three-lane Typ Four-lane Typ Capacity cons	strained by basic from the under constrained the A segments do the A segments do not trained by maximur	eeway capacity. ed operating condi- not operate well at operate weaviren	tions. t volume ratios great	ater than 0.45. Po er than 0.35. Poo pc/h (Type A), 4.0	s using the procedu our operations and so or operations and so 000 (Type B), 3,500	some local queuir ome local queuing (Type C).	ng are expected in	such cases. such cases.	<u>,</u>		

Copyright © 2003 University of Florida, All Rights Reserved

Canara	l Informat		FREEWA								
Genera	i intormat	ion			Site Info	rmation					
Analyst ZS Agency/Company LLG Engineers Date Performed 07/14/10 Analysis Time Period PM Peak Hour					Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	Location	SR-57 SB Katella On to Orangewood Off Caltrans D12 Year 2030 With Project				
Inputs			·								
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 1780 Terrain Leve Conversions to pc/h Under Base Co				el Weaving ratio		VR		A 0.15 0.35			
(pc/h)	V A	PHF		1	1	Е	£0.				
. ,	 		Truck %	RV %	E _T	E _R	fHV	fp fp	. V		
Vo1	7750	0.95	6	0	1.5	1.2	0.971	1.00	8402		
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32		
Vw1	900	0.95	6	0	1.5	1.2	0.971	1.00	975		
Vw2	480	0.95	6	0	1.5	1.2	0.971	1.00	520		
Vw				1495	Vnw		. 8434				
V									9929		
weavin	g and No	n-Weavin				·					
Unconstra Weaving (i = w)					Non-Weaving (i = nw) Weavir			trained	ving (= nw)		
a (Exhibit 2	4-6)	0.19			00	vveavii	ig (i – w)	14011-446a	ving (– mv)		
b (Exhibit 2		2.20		4.00		-		 			
c (Exhibit 2	4-6)	0.97	7	1.	1.30						
d (Exhibit 2		0.80			75						
Weaving intens		0.8		0.	43				·		
Weaving and n speeds, Si (mi/		45.3	8	53.36							
Maximum r	lanes required to the sumber of lanes	, Nw (max)	•		1.36 1.40	if Nw > Nv	v (max) consti	ained operati	on		
Weavin	g Segmer	ıt Speed,	Density,	Level of	Service,	and Cap	acity				
Weaving se	gment speed,	S (mi/h)	•	51.98							
	gment density,	D (pc/mi/ln)		38.20							
Level of se				E							
	base condition			10925							
	a 15-minute fl			10607							
	a full-hour volu	ıme, c _h (veh/h	1)	10077							
b. Capacity cor c. Capacity occ d. Three-lane T e. Four-lane Ty f. Capacity con g. Five-lane Ty	ments longer than a strained by basic from the strained by basic from the strained by a segments do not be a segment on the strained by maximum pe A segments do not from the segments do not from the segments do not segment to se	eeway capacity. ed operating condition of operate well at the condition of the condition o	tions. t volume ratios greavolume ratios grea ng flow rate: 2,800 volume ratios grea	eater than 0.45. Po eter than 0.35. Po pc/h (Type A), 4, ter than 0.20. Poo	oor operations and so or operations and so 000 (Type B), 3,500 or operations and so	some local queui ome local queuin) (Type C). ome local queuin	ng are expected in g are expected in g are expected in	n such cases. such cases. such cases.			

 $HCS2000^{\mathrm{TM}}$

Copyright © 2003 University of Florida, All Rights Reserved

Genera	Informat		· • • • • • • • • • • • • • • • • • • •		/ING WOR		· · · · · · · · · · · · · · · · · · ·				
Analyst Agency/Cor Date Perfor Analysis Tir	npany med	ZS LLG E 07/14	Engineers /10 eak Hour		Freeway/Dir of Weaving Seg Jurisdiction Analysis Year	of Travel Location	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2030 With Project				
Inputs				·							
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 2130 Terrain Leve Conversions to pc/h Under Base Conversions				el vveaving ratio, i		VR		B 0.22 0.20			
(pc/h)	V V	PHF	Truck %	RV %	E _T	E _R	fHV	fp	V		
Vo1	4000	0.95	6	0	1,5	1.2	0.971	1.00	4336		
√o2	10	0.95	6	0	1.5	1.2	0.971	1.00	10		
/w1	900	0.95	6	0	1.5	1,2	0.971	1.00	975		
/w2	230	0.95	6	0	1.5	1.2	0.971	1.00	249		
/w	200	1	L	1224	Vnw	1.2	0.071	1.00	4346		
/				TEET VIII					5570		
-	g and No	n-Weavin	a Speeds	2					0070		
- TCaviii	g and No	II-vvcaviii	Unconstr		ed			Constrained			
Weaving (i = w)					Weavir			ving (= nw)			
a (Exhibit 24	1-6)		0.08		0.00		*				
o (Exhibit 24		2.20		6.00							
Exhibit 24		<u> </u>	0.70 0.50		1.00						
I (Exhibit 24 Veaving intens		0.30		0.50 0.16			·	 			
Weaving and no	on-weaving	55.3			2.46			ļ			
Maximum n	anes required to umber of lanes	for unconstrai , Nw (max) (max) uncons	ned operation, trained operat	Nw ion	1.11 3.50		w (max) consti	rained operati	on		
	g Segmer		Density,		f Service,	and Cap	pacity				
X	gment speed,			60.73							
	gment density,	り (pc/mi/in)		18.34							
_evel of ser Canacity of	base condition	c. (nc/h)		11600							
	a 15-minute flo			11600 11262							
	a full-hour volu			10699							
Notes			·/	1 .0000	-						
a. Weaving seg b. Capacity con c. Capacity occ d. Three-lane Ty e. Four-lane Ty f. Capacity cons g. Five-lane Ty h. Type B weav	strained by basic fre urs under constraine ype A segments do pe A segments do n strained by maximur pe A segments do n	eeway capacity. ed operating condi not operate well a tot operate well at n allowable weavi ot operate well at t	tions. t volume ratios grea volume ratios grea ng flow rate: 2,800 volume ratios great olume ratios great	ater than 0.45. Poter than 0.35. Po pc/h (Type A), 4 ter than 0.20. Po er than 0.80. Poo	as using the procedular or operations and so other operations and so ope	some local queui ome local queuin (Type C). me local queuin ne local queuing	ing are expected in g are expected in g are expected in s are expected in s	n such cases. such cases. such cases. uch cases.	-		

Copyright © 2003 University of Florida, All Rights Reserved

			FREEWA	Y WEAL	ING WOF		Γ			
General	Informat	ion			Site Information					
Analyst Agency/Con Date Perfor Analysis Tin	ned	07/14	ingineers 110 eak Hour		Freeway/Dir Weaving Seç Jurisdiction Analysis Yea	g Location	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2030 With Project			
Inputs				W. M. S. C.	!					
Freeway fre Weaving nu	e-flow speed, mber of lanes, g length, L (ft)		65 5 213 Lev		Weaving type Volume ratio Weaving rati	, VR	B 0.15 0.34			
Convers	sions to p	oc/h Unde	er Base C	ondition	15					
(pc/h)	٧	PHF	Truck %	RV %	E _T	ER	fhv	fp	٧	
Vo1	8370	0.95	6	0	1.5	1.2	0.971	1.00	9074	
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32	
Vw1	950	0.95	6	0	1.5	1.2	0.971	1.00	1030	
Vw2	490	0.95	6	0	1.5	1.2	0.971	1.00	531	
Vw				1561	Vnw				9106	
٧									10667	
Weaving	g and No	n-Weavin	g Speeds	 S				,	<u>'</u>	
			Unconstr		* ******		Cons	trained		
		Weaving		Non-Weaving (i = nw)		Weavin	g (i = w)	Non-Wea	ving (= nw)	
a (Exhibit 24		0.08			.00	ļ				
b (Exhibit 24 c (Exhibit 24		2.20 0.70		6.0		<u> </u>				
d (Exhibit 24		0.50	100		.50	 				
Weaving intensi	ly factor, Wi	0.50			.21					
Weaving and no speeds, Si (mi/h	n-weaving \	51.6	5	60).46					
Number of la Maximum nu	anes required umber of lanes	, Nw (max)			0.70 3.50	if Nw > Nv	ı (max) consti	rained operati	on	
Weaving	g Segmer	nt Speed,	Density,	Level o	f Service,	and Cap	acity	•		
Weaving se	ment speed,	S (mi/h)		58.99						
	ment density,	D (pc/mi/ln)		36.17			,			
Level of serv		, ">		E			•			
- •	pase condition	U		11750						
	a 15-minute fl			11408						
	a full-hour vol	ıme, c _h (veh/h)	10838						
Notes										
 b. Capacity cons 	trained by basic fro			and diverge are	as using the proced	ures of Chapter 2	o, "Ramps and Ra	amp Junctions".		

- c. Capacity occurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
 i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright @ 2003 University of Florida, All Rights Reserved

			FREEWA	Y WEAV	ING WOR	KSHEE	T				
Genera	Informat	ion			Site Info	rmation					
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14/	ngineers 10 eak Hour		Freeway/Dir o Weaving Seg Jurisdiction Analysis Yea	Location	Ball C Caltra	SR-57 SB Ball On to Katella Off Caltrans D12 Year 2030 With Project			
Inputs			·		!						
Freeway fre Weaving nu	e-flow speed, mber of lanes, g length, L (ft)		65 4 249 Lev		Weaving type Volume ratio, Weaving ratio	VR			B 0.20 0.37		
Conver	sions to p	oc/h Unde	r Base C	ondition	IS						
(pc/h)	٧	PHF	Truck %	RV %	Ε _τ	E _R	fHV	fp	v		
Vo1	6750	0.95	6	0	1.5	1.2	0.971	1.00	7318		
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32		
Vw1	1070	0.95	6	0	1.5	1.2	0.971	1.00	1160		
Vw2	640	0.95	6	0	1.5	1.2	0.971	1.00	693		
Vw		. 		1853	Vnw				7350		
V					1				9203		
	g and No	n-Weavin	a Speeds	<u> </u>	·-·				1 0200		
TTCaVIII	g and No	I	Unconstr				Cons	trained			
		Weaving		Non-Weaving (i = nw)		Weavir	ng (i = w)		ving (= nw)		
a (Exhibit 24	l-6)	0.08			00		V /		()		
b (Exhibit 24	l-6)	2.20			00						
c (Exhibit 24	l-6)	0.70)	1.	00						
d (Exhibit 24	l-6)	0.50)	0.	50						
Weaving intens		0.54		0.	28						
Weaving and no speeds, Si (mi/l		50.6	8	58	.06						
Number of I Maximum n	anes required umber of lanes	for unconstrain s, Nw (max) r(max) uncons	,		0.75 3.50	if Nw > Nv	v (max) consti	rained operati	on		
Weavin	g Segmer	nt Speed,	Density,	Level of	f Service,	and Cap	acity				
	gment speed,			56.41			<u>-</u>				
Weaving se	gment density,	D (pc/mi/ln)		40.79							
Level of ser	Level of service, LOS				E						
Capacity of	base condition	i, c _b (pc/h)		9394							
Capacity as	a 15-minute fl	ow raté, c (vel	n/h)	9120							
Capacity as	a full-hour vol	ume, c _h (veh/h)	8664							
Notes					10			,			
b. Capacity con	strained by basic fr		-	and diverge are	as using the proced	ures of Chapter 2	5, "Ramps and R	amp Junctions".			

- ib. Capacity constrained by basic freeway capacity.
 c. Capacity occurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.
 i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

 $HCS2000^{TM}$

Copyright © 2003 University of Florida, All Rights Reserved

Agency/Company Date Performed Analysis Time Period Inputs Freeway free-flow speed, SFF (minum) Weaving number of lanes, Noweaving seg length, L (ft) Ferrain Conversions to pc/h Upc/h) Vo1 7010 0.5 Vo2 30 0.5 Vw1 770 0.5 Vw2 550 0.5 Vw Vw V Weaving and Non-We	07/14/10 PM Peak			Freeway/Dir of Weaving Seg		00					
Agency/Company Date Performed Analysis Time Period Inputs Freeway free-flow speed, SFF (minumer) Weaving number of lanes, Noweaving seg length, L (ft) Ferrain Conversions to pc/h L (pc/h) V Pi L (pc/h) V Pi L (pc/h) V O O O O O O L (pc/h) V O O O O O L (pc/h) V O O O O O O L (pc/h) V O O L (pc	LLG Engir 07/14/10 PM Peak				of Travel	Site Information Freeway/Dir of Travel SR-57 SB					
Freeway free-flow speed, SFF (minum Meaving number of lanes, Note	'h)	Agency/Company LLG Engineers Date Performed 07/14/10 Analysis Time Period PM Peak Hour					o7 SB On to Katella Off rans D12 2030 With Project				
Freeway free-flow speed, SFF (minum Meaving number of lanes, Note	h)				•						
(pc/h) V Pi Vo1 7010 0.9 Vo2 30 0.9 Vw1 770 0.9 Vw2 550 0.9 Vw V Weaving and Non-We W	Neaving number of lanes, N 4 Neaving seg length, L (ft) 2490			Weaving type Volume ratio, Weaving ratio	VR			16 42			
Vo1 7010 0.9 Vo2 30 0.9 Vw1 770 0.9 Vw2 550 0.9 Vw V Weaving and Non-We	Jnder E	3ase C	ondition	ıs							
Vo2 30 0.9 Vw1 770 0.9 Vw2 550 0.9 Vw V W Weaving and Non-We	4F]	Fruck %	RV %	E _T	E _R	fHV	fp	٧			
√w1 770 0.9 √w2 550 0.9 √w ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓)5	6	0	1.5	1.2	0.971	1.00	7600			
Vw2 550 0.9 Vw V Weaving and Non-We	95	6	0	1.5	1.2	0.971	1.00	32			
Weaving and Non-We	95	6	0	1.5	1.2	0.971	1.00	834			
Weaving and Non-We)5	6	0	1.5	1.2	0.971	1.00	596			
Weaving and Non-We	L		1430	Vnw				7632			
Weaving and Non-We								9062			
w	aving S	Speeds						1 000=			
	uring (Unconstr				Cons	trained				
a (Exhibit 24-6)	eaving (i =			ving (i = nw)	Weavir	ıg (i = w)		ving (= ຄw)			
	0.08		0.	00							
c (Exhibit 24-6)	2.20			00							
c (Exhibit 24-6)	0.70		1.	00							
d (Exhibit 24-6)	0.50		0.	50							
Weaving intensity factor, Wi	0.49		0.	22							
Weaving and non-weaving speeds, Si (mi/h)	51.82		60	.13							
Number of lanes required for unco Maximum number of lanes, Nw (n if Nw < Nw(max) u	ах)			0.56 3.50	if Nw > Nv	v (max) constr	rained operation	on			
Weaving Segment Sp	eed, De	ensity,	Level of	Service,	and Cap	acity					
Weaving segment speed, S (mi/h)			58.64								
Weaving segment density, D (pc/	mi/ln)		38.63								
Level of service, LOS			E								
Capacity of base condition, c _b (pc			9400								
Capacity as a 15-minute flow rate			9126								
Capacity as a full-hour volume, c _h	(veh/h)		8670								
Notes											

- a. Capacity constrained by basic freeway capacity.
 c. Capacity occurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.
 i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

 $HCS2000^{\mathrm{TM}}$

Copyright © 2003 University of Florida, All Rights Reserved

APPENDIX Q-III

YEAR 2030 WITH PROJECT WITH MITIGATION
TRAFFIC CONDITIONS – CALTRANS FREEWAY RAMP
ANALYSIS (HCM METHODOLOGY)

MERGE/DIVERGE ANALYSIS

THIS	P	AGE	LEFT	BL	ANK	INTE	VTIC	NALI	\mathbf{Y}
					TT 1 T Z	******	1110	▗▘▗▗▗▗▗	/ JL

WEAVING ANALYSIS

· -			<u> FREEWA</u>	Y WEAL	ING WOF	KKSHEE	Ţ			
Genera	il Informa	tion			Site Info	rmation		•		
Analyst Agency/Co Date Perfo Analysis Ti	rmed	07/14/	ngineers 10 eak Hour		Freeway/Dir Weaving Seç Jurisdiction Analysis Yea	g Location	SR-57 SB Katella On to Orangewood Of Caltrans D12 Year 2030 With Project With M			
Inputs					<u> </u>			 	 	
Freeway fr Weaving n Weaving s Terrain	ee-flow speed, umber of lanes eg length, L (ft)	, N	65 5 178 Lev	el	Weaving type Volume ratio Weaving ratio	, VR	A 0.13 0.16			
	rsions to p	7	***************************************				1 -	Т .	,	
(pc/h)		PHF	Truck %	RV %	E _T	E _R	fHV	fp	٧	
Vo1	5783	0.95	6	0	1.5	1.2	0.971	1.00	6269	
Vo2	8	0.95	6	0	1.5	1.2	0.971	1.00	8	
Vw1	717	0.95	6	0	1.5	1.2	0.971	1.00	777	
Vw2	142	0.95	6	0	1.5	1.2	0.971	1.00	153	
Vw				930	Vnw				6277	
V									7207	
Weavin	g and No	n-Weavin	g Speeds	<u> </u>						
			Unconstr				Cons	trained		
(5.11116	4.0	Weaving	**	Non-Weaving (i = nw) 0.00		Weavir	ıg (i = w)	Non-Wea	ving (= nw)	
a (Exhibit 2			0.15							
b (Exhibit 2		2.20			00 30		·			
c (Exhibit 24-6) 0.97					ას 75			ļ		
		(Exhibit 24-6) 0.80		U.	10					
d (Exhibit 2	4-6)			Ω	27					
d (Exhibit 2 Veaving intensive and re-	4-6) sity factor, Wi ion-weaving	0.80 0.57 50.04			27 .47					
d (Exhibit 2 Weaving intens Weaving and r speeds, Si (mi Number of Maximum r	4-6) sity factor, Wi ion-weaving	0.57 50.04 for unconstrain s, Nw (max)	l ed operation,	58 Nw	.47 1.19 1.40	if Nw > Nw	ι (max) constr	ained operati	on	
d (Exhibit 2 Weaving intensive and respeeds, Si (mit Number of Maximum r	4-6) sity factor, Wi ion-weaving h) lanes required number of lanes	0.57 50.04 for unconstrain s, Nw (max) r(max) unconst	l ed operation, rained operati	58 Nw on	.47 1.19 1.40		ı (max) constr	ained operati	on	
d (Exhibit 2 Weaving intensive systems of the speeds, Si (mit Number of Maximum r Weaving se	4-6) sity factor, Wi son-weaving h) lanes required number of lanes If Nw < Nw g Segmen egment speed,	0.57 50.04 for unconstraints, Nw (max) (max) unconstraint Speed, S (mi/h)	l ed operation, rained operati	58 Nw on	.47 1.19 1.40			ained operati	on	
d (Exhibit 2 Weaving intensive and respeeds, Si (mit Number of Maximum respeeds) Weaving see Weaving see Weaving see	4-6) sity factor, Wi on-weaving h) lanes required number of lanes If Nw < Nw eg Segmen egment speed, egment density,	0.57 50.04 for unconstraints, Nw (max) (max) unconstraint Speed, S (mi/h)	l ed operation, rained operati	58 Nw on Level of 57.23 25.19	.47 1.19 1.40			ained operati	on	
d (Exhibit 2 Weaving intensive sylventry in the speeds, Si (mi) Number of Maximum r Weaving se Weaving se Level of se	4-6) sity factor, Wi on-weaving h) lanes required number of lanes If Nw < Nw g Segment egment speed, egment density, rvice, LOS	0.57 50.04 for unconstraints, Nw (max) f(max) unconstraint Speed, S (mi/h) D (pc/mi/in)	l ed operation, rained operati	58 Nw on Level of 57.23 25.19 C	.47 1.19 1.40			ained operati	on	
d (Exhibit 2 Weaving intensive awing and respeeds, Si (mi) Number of Maximum respeeds Weaving see Weaving see Level of see	4-6) sity factor, Wi on-weaving h) lanes required number of lanes If Nw < Nw eg Segmen egment speed, egment density,	0.57 50.04 for unconstraints, Nw (max) f(max) unconstraint Speed, S (mi/h) D (pc/mi/in)	l ed operation, rained operati	58 Nw on Level of 57.23 25.19	.47 1.19 1.40			ained operation	on	
d (Exhibit 2 Weaving intensive away in the speeds, Si (mi) Number of Maximum r Weaving se Weaving se Level of secondary as Capacity as	4-6) sity factor, Wi on-weaving h) lanes required number of lanes If Nw < Nw g Segment egment speed, egment density, rvice, LOS base condition s a 15-minute file	0.57 50.04 for unconstraints, Nw (max) fr(max) unconstrait Speed, S (mi/h) D (pc/mi/ln) ow rate, c (veh	ed operation, rained operati Density, /h)	58 Nw on Level of 57.23 25.19 C	.47 1.19 1.40			ained operati	on	
d (Exhibit 2 Weaving intensive away in the speeds, Si (mi) Number of Maximum r Weaving se Weaving se Level of secondary as Capacity as	sity factor, Wi non-weaving h) lanes required number of lanes If Nw < Nw g Segment egment speed, egment density, rvice, LOS	0.57 50.04 for unconstraints, Nw (max) fr(max) unconstrait Speed, S (mi/h) D (pc/mi/ln) ow rate, c (veh	ed operation, rained operati Density, /h)	58 Nw on Level of 57.23 25.19 C 11081	.47 1.19 1.40			ained operati	on	

- c. Capacity constrained by pasic treeway capacity.
 c. Capacity occurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.
 j. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright © 2003 University of Florida, All Rights Reserved

			FREEWA	Y WEAV			<u> </u>			
Genera	l Informat	ion			Site Info	rmation		<u> </u>		
Analyst Agency/Co Date Perfor Analysis Tir	med	07/14	Engineers /10 eak Hour		Freeway/Dir o Weaving Seg Jurisdiction Analysis Yea	Location	Katell Caltra	SR-57 SB Katella On to Orangewood Of Caltrans D12 Year 2030 With Project With I		
Inputs					<u> </u>					
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 178 Terrain Leve Conversions to pc/h Under Base C			el	Weaving type Volume ratio, Weaving ratio	VR	A 0.15 0.35				
Conver	sions to p	c/h Unde	er Base C	ondition						
(pc/h)	٧	PHF	Truck %	RV %	Ε _τ	E _R	fhv	fp	٧	
Vo1	6458	0.95	6	0	1.5	1.2	0.971	1.00	7001	
Vo2	25	0.95	6	0	1.5	1.2	0.971	1.00	27	
Vw1	750	0.95	6	0	1.5	1.2	0.971	1.00	813	
Vw2	400	0.95	6	0	1.5	1.2	0.971	1.00	433	
Vw				1246	Vnw				7028	
V									8274	
Weavin	g and No	n-Weavin	g Speed	 3					1	
	<u> </u>		Unconsti				Cons	trained		
		Weaving		Non-Weaving (i = nw)		Weavir	ıg (i = w)	Non-Wea	ving (= nw)	
a (Exhibit 2		0.1			00			<u> </u>		
b (Exhibit 2		2.20			00					
c (Exhibit 2 d (Exhibit 2		0.9			30			 		
Weaving intens		0.6		0.75 0.34						
Weaving and n	on-weaving	47.7			.98				-	
Maximum r	ny lanes required t number of lanes	for unconstrai , Nw (max)	ned operation	Nw	1.33 1.40	if Nw > Nv	v (max) consti	rained operati	on	
_					Service,		<u> </u>			
	gment speed,			54.56						
	gment density,	D (pc/mi/ln)		30.33						
Level of se	vice, LOS			D						
	base condition			10925						
 		,, , , , , , , , , , , , , , , , , , ,	 	10607						
Capacity as a 15-minute flow rate, c (veh/h) Capacity as a full-hour volume, c _h (veh/h)			1)	10077						
oupuoity at										

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions b. Capacity constrained by basic freeway capacity.
 c. Capacity occurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.
 i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright @ 2003 University of Florida, All Rights Reserved

			FREEWA	Y WEAV	ING WOF	RKSHEE	<u> </u>			
Genera	Informat	ion			Site Info	rmation				
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14/	ngineers 10 eak Hour		Freeway/Dir Weaving Se Jurisdiction Analysis Yea	g Location	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2030 With Project With I			
Inputs				······································						
Freeway fre Weaving nu Weaving se Terrain	e-flow speed, mber of lanes, g length, L (ft)	N	65 5 213 Lev	el	el Weaving ratio, R			B 0.22 0.20		
Conver	sions to p	c/h Unde	r Base C	ondition	ıs					
(pc/h)	V	PHF	Truck %	RV %	E _T	ER	fHV	fp	٧	
Vo1	3333	0.95	6	0	1.5	1.2	0.971	1.00	3613	
Vo2	8	0.95	6	0	1.5	1.2	0.971	1.00	8	
Vw1	750	0.95	6	0	1.5	1.2	0.971	1.00	813	
Vw2	192	0.95	6	0	1.5	1.2	0.971	1.00	208	
Vw				1021	Vnw		·		3621	
/				<u> </u>		J			4642	
Weaving	g and No	n-Weavin	a Speeds	3	<u> </u>			<u> </u>	1 17 12	
			Unconstr			· · · · · · · · · · · · · · · · · · ·	Cons	trained		
		Weaving	(i = w)	Non-Weaving (i = nw)		Weavir	ıg (i = w)		ving (= nw)	
a (Exhibit 24	l-6)	0.08		0.	00					
b (Exhibit 24		2.20		6.	00					
c (Exhibit 24		0.70		1.	00					
d (Exhibit 24		0.50			50					
Weaving intensi		0.32		0.	13					
Weaving and no speeds, Si (mi/h	n-weaving)	56.64	1	63	.56					
Maximum nı	ımber of lanes	for unconstrain , Nw (max) (max) unconst	•		1.13 3.50	■ if Nw > Nu	r (max) constr	ained operati	on .	
		` '			Service,					
	gment speed,			61.90						
Weaving se	ment density,	D (pc/mi/ln)		15.00						
Level of sen	rice, LOS			В						
Capacity of I	pase condition	, c _b (pc/h)		11599						
Capacity as	a 15-minute flo	ow rate, c (veh	/h)	11261						
Capacity as	a full-hour volu	ıme, c _h (veh/h))	10698						
Notes										
a. Weaving segr	nents longer than 2 trained by basic fre		as isolated merge	and diverge area	s using the proced	ures of Chapter 2	5, "Ramps and Ra	mp Junctions".		

- Capacity constrained by basic freeway capacity.
 Capacity occurs under constrained operating conditions.
 Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 Capacity constrained by maximum allowable wearing flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 Five-lane Type A segments do not operate well at volume ratios greater than 0.90. Poor operations and some local queuing are expected in such cases.

- n. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

 Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright © 2003 University of Florida, All Rights Reserved

Ganara	l Informat			· · · · · ·	/ING WORKSHEET Site Information						
Genera	mormat	HUII			Site info	Freeway/Dir of Travel SR-57 NB					
Analyst Agency/Co Date Perfor Analysis Ti	med	07/14	ingineers /10 eak Hour		Freeway/Dir Weaving Seo Jurisdiction Analysis Yea	Location	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2030 With Project With M				
Inputs							<u> </u>		-		
Weaving no Weaving se Terrain	ee-flow speed, umber of lanes, eg length, L (ft)	N ,	65 5 213 Lev	el	Weaving type Volume ratio Weaving ratio	, VR	8 0.15 0.34				
	sions to p	1		1	· .	T	1	T			
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fhv	fp	٧		
Vo1	6975	0.95	6	0	1.5	1.2	0.971	1.00	7562		
Vo2	25	0.95	6	0	1.5	1.2	0.971	1.00	27		
Vw1	792	0.95	6	0	1.5	1.2	0.971	1.00	858		
Vw2	408	0.95	.6	0	1.5	1.2	0.971	1.00	442		
√w				1300	Vnw			7589			
V						•			8889		
Weavin	g and No	n-Weavin	g Speeds	3					<u> </u>		
	<u></u>		Unconstr				Cons	trained			
Weaving (i = w)			Non-Wea	ving (i = nw)	Weavir	ıg (i = w)	Non-Wea	ving (= nw)			
a (Exhibit 2		0.0		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	.00						
b (Exhibit 2		4	2.20 0.70		6.00 1.00			<u> </u>			
c (Exhibit 2 d (Exhibit 2		0.70			.50						
Weaving intens		0.34			* * * * * * * * * * * * * * * * * * * *						
Neaving and n	on-weaving	53.1		0.17 61.82							
Maximum r	n) lanes required t umber of lanes If Nw < Nw	for unconstrain , Nw (max)	ned operation,	Nw	0.71 3.50	if Nw > Nw	ı (max) consti	rained operati	on		
Weavin	g Segmer	nt Speed,	Density,	Level of	f Service,	and Cap	acity				
Neaving se	gment speed,	S (mi/h)		60.38							
	gment density,	D (pc/mi/ln)		29.44							
evel of se				D		•					
	base condition			11750							
	a 15-minute flo			11408		······································					
Capacity as	a full-hour volu	ume, c _h (veh/h	1)	10838							
 Capacity cor Capacity occ Three-lane T Four-lane Ty Capacity con Five-lane Ty Five-lane Ty 	strained by basic fro urs under constraine ype A segments do pe A segments do n strained by maximur	eeway capacity. ed operating condition of operate well at a common allowable weaving of operate well at a common operate wel	tions. It volume ratios grea volume ratios grea 1g flow rate: 2,800 volume ratios great	ater than 0.45. P ter than 0.35. Po pc/h (Type A), 4 ter than 0.20. Po	as using the procedi foor operations and so ,000 (Type 8), 3,500 or operations and so	some local queuin ome local queuin (Type C). ome local queuing	ng are expected in g are expected in g are expected in s	such cases, such cases. such cases.			

Analyst Agency/Company Date Performed Analysis Time Period Inputs Freeway free-flow speed, Si Neaving number of lanes, N Neaving seg length, L (ft) Ferrain Conversions to po pc/h) V /o1 6750 /o2 30 /w1 1070 /w2 640	ZS LLG Er 07/14/1 AM Pe FF (mi/h) N	65 5 249 Leve	el	Volume ratio,	of Travel Location	Caltra	7 SB On to Katella C Ins D12 2030 With Pro B		
Agency/Company Date Performed Analysis Time Period Inputs Freeway free-flow speed, Si Weaving number of lanes, N Weaving seg length, L (ft) Ferrain Conversions to po pc/h) V /o1 6750 /o2 30 /w1 1070 /w2 640	LLG Er 07/14/1 AM Per FF (mi/h) N C/h Unde PHF 0.95	65 5 249 Lev	el	Weaving Seg Jurisdiction Analysis Yea Weaving type Volume ratio,	Location	Ball C Caltra	On to Katella Cons D12 2030 With Pro		
Freeway free-flow speed, Si Weaving number of lanes, N Weaving seg length, L (ft) Ferrain Conversions to po pc/h) V /o1 6750 /o2 30 /w1 1070 /w2 640	c/h Unde PHF 0.95	5 249 Leve r Base C	el	Volume ratio,			В		
Freeway free-flow speed, Si Weaving number of lanes, N Weaving seg length, L (ft) Ferrain Conversions to po pc/h) V /o1 6750 /o2 30 /w1 1070 /w2 640	c/h Unde PHF 0.95	5 249 Leve r Base C	el	Volume ratio,			В		
pc/h) V /o1 6750 /o2 30 /w1 1070 /w2 640	PHF 0.95		and 14:	ef vveaving ratio, R			B 0.20 0.37		
/o1 6750 /o2 30 /w1 1070 /w2 640	0.95	Truck %	onaidon	ıs					
/o2 30 /w1 1070 /w2 640			RV %	E _T	ER	fHV	fp	y	
/w1 1070 /w2 640	0.95	6	0	1.5	1.2	0.971	1.00	7318	
/w2 640	0.00	6	0	1.5	1.2	0.971	1.00	32	
	0.95	6	0	1.5	1.2	0.971	1.00	1160	
/w	0.95	6	0	1.5	1.2	0.971	1.00	693	
/ ¥¥			1853	Vnw	-	· · · · · · · · · · · · · · · · · · ·	·•	7350	
7				<u> </u>				9203	
Weaving and Non	-Weaving	Speeds						<u> </u>	
		Unconstr				Cons	trained		
	Weaving	(i = w)	Non-Wea	ving (i = nw)	Weavir	g (i = w)		ving (= nw)	
(Exhibit 24-6)	0.08		0.	00					
(Exhibit 24-6)	2.20		6.	00					
(Exhibit 24-6)	0.70			00					
(Exhibit 24-6)	0.50			50		·			
Veaving intensity factor, Wi	0.46		0.	22			<u> </u>		
Veaving and non-weaving peeds, Si (mi/h)	52.59)	60	.02				•	
Number of lanes required fo Maximum number of lanes, If Nw < Nw{r	Nw (max)	·		0.94 3.50	if Nw > Nv	r (max) constr	rained operation	оп	
Weaving Segment	t Speed,	Density,	Level of	Service,	and Cap	acity			
Weaving segment speed, S			58.36						
Neaving segment dénsity, [D (pc/mi/ln)		31.54						
evel of service, LOS			D						
Capacity of base condition,	c _b (pc/h)		11742						
Capacity as a 15-minute flow	w rate, c (veh	/h)	11400						
Capacity as a full-hour volur	me, c _h (veh/h)		10830						
Notes			-						

- apacity constrained by basic freeway capacity.
 c. Capacity occurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

 $HCS2000^{\text{TM}}$

Copyright @ 2003 University of Florida, All Rights Reserved

Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Genera	Informat				/ING WOR		4			
	·····VIIIIAI									
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14/	ingineers 10 eak Hour		Freeway/Dir of Weaving Seg Jurisdiction Analysis Yea	Location	Ball C Caltra	R-57 SB Jall On to Katella Off Caltrans D12 Jear 2030 With Project With M		
				Allaysis real real 20				2000 111011 10	Jeor Will W	
Inputs										
Weaving nu	e-flow speed, mber of lanes, g length, L (ft)		65 5 249 Lev		Weaving type Volume ratio, Weaving ratio	VR	B 0.16 0.42			
Conver	sions to p	oc/h Unde	r Base C	ondition	ıs					
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fHV	fp	٧	
Vo1	7010	0.95	6	0	1.5	1.2	0.971	1.00	7600	
Vo2	30	0.95	6	0	1.5	1.2	0.971	1.00	32	
Vw1	770	0.95	6	0.	1.5	1,2	0.971	1.00	834	
Vw2	550	0.95	6	0	1.5	1.2	0.971	1.00	596	
/w		•	<u> </u>	1430	Vnw			1	7632	
·	1								9062	
Weavin	g and No	n-Weavin	a Speeds							
	,		Unconstr				Cons	trained		
		Weaving	(i = w)	Non-Wea	ving (i = nw)	Weavir	ng (i = w)		ving (= nw	
a (Exhibit 24	1-6)	0.08		0.	.00					
b (Exhibit 24		2.20)	6.	.00					
c (Exhibit 24		0.70		1.	.00					
d (Exhibit 2	1-6)	0.50)	0.	.50					
Neaving intens	ity factor, Wi	0.42	2	0.	.17					
Neaving and no speeds, Si (mi/l	on-weaving 1)	53.6	7	61	.81					
Number of I Maximum n	anes required umber of lanes	for unconstrair s, Nw (max) (max) unconst	•		0.72 3.50	if Nw > Nv	v (max) constr	rained operati	on	
Weavin	g Segmer	nt Speed,	Density,	Level of	f Service,	and Cap	acity			
	gment speed,			60.36						
	gment density,	D (pc/mi/ln)		30.02						
evel of ser		• •		D						
Capacity of	base condition	, c _b (pc/h)		11750						
Capacity as	a 15-minute fl	ow rate, c (veh	ı/h)	11408						
Capacity as	a fuli-hour vol	ume, c _h (veh/h	.)	10838						
		·		_						

- a. Capacity constrained by basic treeway capacity.
 b. Capacity cocurs under constrained operating conditions.
 d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
 d. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
 d. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
 h. Type B weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.
 i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Copyright @ 2003 University of Florida, All Rights Reserved