APPENDIX N

YEAR 2013 TRAFFIC CONDITIONS FREEWAY RAMP LEVEL OF SERVICE CALCULATION WORKSHEETS – CALTRANS FACILITIES ANALYSIS (HCM METHODOLOGY)

APPENDIX N-I

YEAR 2013 WITHOUT PROJECT TRAFFIC CONDITIONS – CALTRANS FREEWAY RAMP ANALYSIS (HCM METHODOLOGY)

MERGE/DIVERGE ANALYSIS

		RAMP	S AND	RAM	P JUN	CTIONS	s W	ORKS	HEE	ĒΤ		
	Informati					Site In				-		
Analyst2 Agency or Co Date Perform Analysis Timo Project Desci	ied	ZS LLG Engi 07/14/10 AM Peak ear 2013 With	Hour	ct I-5 NB	Ju Ju Ar	reeway/Dir unction urisdiction nalysis Yea		vel	On Ca	Itrans [at Katella 012 3 Without Proj	ect
Inputs	7471	04/ 2010 1114	iout i ioje	OCTOTED	On-Kamp	at Italcila						
Upstream Ad	j Ramp	Terrain Leve	el		•		····	****	-	······································	Downstrea	m Adj Ramp
Yes	™ On										Yes	I On
∭ No	I off							,			No L _{down} =	Toff ft
L _{up} =	1400 ft			-,							down	κ.
Vu =	262 veh/h	•	S _{FF} = 70		show lane	s, L _A , L _D ,V		35.0 mp	h		Vo =	veh/h
Convers	ion to pc	/h Under	Base	Condi	tions							*****
(pc/h)	V (Veh/hr)	PHF	Ten		Truck	%Rv		f _{HV}		f _p	v=V/PHF f _t	_{IV} ^f p
Freeway Ramp	4828 213	0.90 0.90	Lev		9	0		957		.00	5606	****
UpStream	262	0.90	Lev Lev	~~~	9	0	_	957 957		.00 .00	247 304	
DownStream		0.00	201	<u> </u>			<u> </u>	301	1.	.00	304	
		Merge Areas			<u> </u>				Diverç	je Area	s	
Estimatio	on of v ₁₂					Estima	tion	of v ₁	2			****
	ation 25-2 or 2 using Equatio	-				L _{EQ} = (Eq P _{FD} = usi V ₁₂ = pc/	ing Ed	n 25-8 or		_R + (V _F	- V _R)P _{FD}	
Capacity	Checks					Capaci	ty C	hecks	;			
	Actua	l Max	imum	LOS	6 F?			Actua		Ма	ximum	LOS F?
V_{FO}	5853	See Ext	nibit 25-7	No	0	V _{FI} =V _F	:				thibit 25-14	
V _{R12}	2188	460	0:All	No)	$V_{FO} = V_{F}$ V_{R}	-				hibit 25-14	
				٠		V _R				See Ex	xhibit 25-3	
Level of	Service D	etermina)	ation (i	f not F	5)	Level o	f Se	rvice	Det	ermi	nation (if	not F)
$D_R = 5$.475 + 0.0073	4 v _R + 0.007	8 V ₁₂ - 0.0	0627 L _A		·	[$O_R = 4.252$	2 + 0.0	0086 V	₁₂ - 0.009 L _D	
O _R = 19.3	3 (pc/ m/ln)					D _R = (pc/ m	/in)				
.OS = B (E	xhibit 25-4)					LOS= (Exhib	it 25-4)				
Speed Es	stimation					Speed	Esti	matio	n			
$M_{\rm S} = 0.32$	21 (Exibit 25-	19)				D _s ≂	(Exhi	bit 25-19)				·····
=) mph (Exhibi	•					nph (Exhibit 25	i-19)			
	2 mph (Exhibi	=			1		nph	(Exhibit 2	5-19)			
	 Smph (Exhibi	•				-	nph (Exhibit 25	i-15)			
OTM			Conveigh	ተ <i>ሮ</i> ነ ኃ ስበስ ፲፲	niversity of	Florida All						Vorsi

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		RAMP	SANE	RAM	P JUN	CTION	s wc	RKS	HEI	ET		
General	Informat	ion				Site In						
	ned	ZS LLG Engi 07/14/10 PM Peak ear 2013 Witt	Hour	ect I-5 NB	il Il A	reeway/Dir unction urisdiction nalysis Yea o at Katella		el	Oi Ca	altrans C	at Katella 012 3 Without Pro	ject
Inputs		Terrain Leve	<u> </u>									
Upstream Ad	j Ramp	Terrail Leve	;i								1	am Adj Ramp
▼ Yes	⊠ On				i						F Yes ✓ No	∭ On ∭ Off
No No	I Off										L _{down} =	ft
r ^{nb} =	1400 ft		\ - 70		··						_	•
	377 veh/h		S _{FF} = 70	Sketch (es, L _A , L _D ,V		35.0 mp	h		VD =	veh/h
Convers	ion to pc	/h Under	Base	Condi	tions							
(pc/h)	(Veh/hr)	PHF		rain	Truck	%Rv		١٧		f _p	v=V/PHF f	_{HV} f _p
Freeway Ramp	7471 306	0.90 0.90	Le ₁		9	0	0.9			.00	8675	
UpStream	377	0.90	Lev		9	0	0.9			.00	355 438	
DownStream												
Estimatio	on of V ₁₂	Merge Areas				Estima	tion	of v.	Diver	ge Areas	S	
L _{EQ} = (Equa P _{EM} = 0.333 V ₁₂ = 2886	ation 25-2 or 2 using Equation	-				L _{EQ} ≝ (Ed P _{FD} = us V ₁₂ = pc/	quation ing Equ	V ₁ 25-8 or	₂ = V		- V _R)P _{FD}	700
Capacity	Checks		****			Capaci		necks	•			 -
	Actua	l Maxi	mum	LOS	F?		· · · · · · · · · · · · · · · · · · ·	Actua		Ma	ximum	LOS F?
V_{FO}	9030	See Ext	ibit 25-7	No	,	V _{FI} =V _F	=			See Ex	hibit 25-14	
FO						V ₁₂				44	00:All	
V _{R12}	3241	460	0:Ali	No)	$V_{FO} = V_{F}$ V_{R}	-			See Exi	hibit 25-14	
					,	V_{R}				See Ex	chibit 25-3	
	Service E				7)	Level o	f Sei	vice	Det	ermir	nation (it	not F)
	5.475 + 0.0073	4 v _R + 0.007	8 V ₁₂ - 0.0	00627 L _A			D _F	= 4.25	2 + 0.	0086 V ₁	₂ - 0.009 L _D	
	5 (pc/ m/ln)					D _R = (pc/ m/lr	1)				4
	xhibit 25-4)			<u></u>			Exhibit					
	stimation					Speed .						
•	36 (Exibit 25-	•			1	•	•	t 25-19)				
••	2 mph (Exhibi	•			t t	•••		xhibit 25	•			
•	mph (Exhibi	•	1	S ₀ = mph (Exhibit 25-19) S = mph (Exhibit 25-15)								
S= 59.7	mph (Exhibi	1 20-14)				S= n	nph (E)	xnibit 25	-15)			

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	<u></u>	RAM	PS AN	D RAME	JUNC	TIONS W	ORKSHI	EET			
General Info	rmation			Si	te Infor						
Analyst		ZS			Fre	eway/Dir	of Trave	I	-5 SB		
Agency or Co		LLG Eng	ineers	3		nction				p at Kate	lla
Date Perform	ed	07/14/10			Jui	risdiction			Caltrans		
Analysis Time	Period	AM Peak	Hour	•	An	alysis Ye	аг	7	ear 201	3 Withou	ut Project
Project Descri	iption AM	Year 2013	Witho	ut Projec	t I-5 SB	Off-Ram	p at Kate	lla			
Inputs											
Upstream Adj	·	Terrain Le	vel	×						Downstr Ramp	eam Adj
Yes 🗔	On									I≣ Yes	ि On
□ No 🗷	Off									I No	I Off
L _{up} = 11	30 ft									L _{down} =	ft
		S		70.0 mph			_{FR} = 35.	0 mp	ħ	VD =	veh/h
	4 veh/h				show lar	nes, L _A , L	$_{D}, V_{R}, V_{f})$			VD =	ven/n
Conversion t	o pc/h Und	der Base C	onditi	ons							
(pc/h)	V (Veh/hr)	PHF	Те	rrain	Truck	%Rv	f _{HV}		fp	v=V/PHI f _{HV} f _p	F
Freeway	5735	0.90	Le	vel	9	0	0.957	十	1.00	6659	
Ramp	626	0.90	Le	vel	9	0	0.957		1.00	727	
UpStream	514	0.90	Le	vel	9	0	0.957	1	1.00	597	
DownStream											
		rge Areas							erge Area	as	
Estimation of	f v ₁₂	·				Estimati	on of v ₁₂	?			
	V ₁₂ =	$V_F (P_{FM})$					'	/ ₁₂ =	V _R + (V _F	- V _R)P _{FD}	
L _{EQ} = (Equat	ion 25-2 or	25-3)				L _{EQ} = (E	quation 2	5-8 o	r 25-9)		
P _{FM} = using E	quation						260 usin				
V ₁₂ = pc/h							10 pc/h	•			
Capacity Che	cks						/ Checks				
	Actual	Maxim	um	LOS	F?	<u>' '</u>	Act		Maxi	mum	LOS F?
		See Exhi	hit 25.			V _{FI} =V _F	566	51	96	500	No
V _{FO}		7	DIL 20		İ	V ₁₂	201	.0	440	0:All	No
V _{R12}		4600:	Ali			$V_{FO} = V_{F}$ V_{R}	493	4	960	00 .	No
*****				**		V _R	72	7	380	00	No
Level of Serv	ice Detern	nination (if	not F	')	•	Level of	Service	Deter	minatio	n (if not F	
D _R = 5.475 +	· 0.00734 v	_R + 0.0078	3 V ₁₂ -	0.00627	L _Δ		$D_{\rm p} = 4.2$:52 +	0.0086 \	/ ₁₂ - 0.009	L _D
D _R = (pc/ m			12		• •	D _R = 3	2.6 (pc/ n			12	Б
LOS = (Exhil	oit 25-4)					LOS=	A (Exhibi	t 25-4	i)		
Speed Estima	ation		, .	,		Speed E	stimatio	7			·
M _S = (Exibi	t 25-19)		·			D _s =	0.493 (E)	hibit	25-19)	·	
	Exhibit 25-	-19)				S _R =	56.2 mpl	ı (Exh	nibit 25-1	9)	
	(Exhibit 25-	•				S ₀ = 73.6 mph (Exhibit 25-19)					
	(Exhibit 25-	=				I -	66.3 mpł				
OOOTM	,		Converient	+ @ 3000 II-			Rights Reserve			~,	Versi

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General Info	rmation	RAM	PS AN			TIONS W	ORKSH	EET				
Analyst	ιπιαυση	ZS		Si	te Infor	<i>mation</i> eeway/Dii	of Trave	۲ ا <u>د</u>	-5 SB			
Agency or Co	mpany	LLG Eng	ineer	S		nction	JI Have			p at Kate	ella	
Date Perform		07/14/10				risdiction			Caltrans		Jiiu	
Analysis Time	e Period	PM Peak	Hour		An	alysis Ye	ar				ut Project	
Project Descr	ription PIV	Year 201	3 Witho	out Projec	ct I-5 SI	3 Off-Ran	np at Kat	ella				
Inputs		Tarreia L								1		
Upstream Ad	-	Terrain Le	evei							Downst Ramp	ream Adj	
Yes 🗏	On									∏ Yes	™ On	
∏ No 🗵	Off		•							₩ No	☐ Off	
L _{up} = 11	.30 ft					<u></u>	. ·			L _{down} =	ft	
	14	S		70.0 mph			S _{FR} = 35	.0 mp	h	VD =	veh/h	
	4 veh/h				how lar	ies, L _A , L	$_{D}$, V_{R} , V_{f})			\\\	VC1//11	
Conversion	1	der Base (Condit	ions	<u></u>					Lyapan		
(pc/h)	V (Veh/hr)	PHF	Te	errain	Truck	%Rv	f _{HV}		f _p	v=V/PH f _{HV} f _p	-	
Freeway	7121	0.90	Le	vel	9	0	0.957		1.00	8268		
Ramp	247	0.90	Le	vel	9	0	0.957		1.00	287		
UpStream	474	0.90	Le	vel	9	0	0.957		1.00	550		
DownStream												
Catimatian a		erge Areas	····			F-4:4			erge Area	as		
Estimation o			•			Estimati	ion of v ₁					
		V _F (P _{FM})						.~		-V _R)P _{FD})	
L _{EQ} = (Equa		25-3)				i .	quation 2					
P _{FM} = using E	Equation	•						ng Eq	uation 0			
V ₁₂ = pc/h							32 pc/h					
Capacity Ch						Capacit	y Check					
	Actual	Maxin	num	LOS	F?		Ac		1	i	LOS F?	
V_{FO}	}	See Exh	ibit 25-			V _{FI} =V _F	66	15		00	No	
10	<u> </u>	7				V ₁₂	19	32	440	0:All	No	
V _{R12}		4600	:Alí			$V_{FO} = V_{F}$ V_{R}	63	28	960	00	No	
						V_{R}	28	7	380	00	No	
Level of Serv						Level of	Service	Dete	rminatio	n (if not l	-)	
$D_R = 5.475 -$	+ 0.00734 v	_R + 0.007	8 V ₁₂ -	0.00627	L_A		$D_R = 4.$	252 +	0.0086 V	/ ₁₂ - 0.009	9 L _D	
$D_R = (pc/r)$	ni /ln)					D _R =	2.0 (pc/ ı	ni /ln)				
_OS = (Exhi	bit 25-4)					LOS=	A (Exhib	it 25-4	4)			
Speed Estim	ation					Speed E	stimatio	n				
M _s = (Exib	it 25-19)					D _s =	0.454 (E	xhibit	25-19)			
S _R = mph	(Exhibit 25	-19)				S _R =	57.3 mp	h (Ex	hibit 25-1	9)		
_	(Exhibit 25	-19)				S _o =	71.6 mp	h (Ex	hibit 25-1	9)		
-	(Exhibit 25	-				S = (66.7 mp	h (Exl	hibit 25-1	5)		
00 TM			Converiet	ot €0 2000 I In	iversity of		Rights Reserv			•	Vers	

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		RAMP	S AND	RAMI	P JUN	CTIONS	S W	ORKS	HEET			
General	Informati					Site In						
Analyst2 Agency or Co Date Perform Analysis Time Proiect Descr	ied	ZS LLG Engi 07/14/10 AM Peak ear 2013 With	Hour	ct SR-57	Ju Ju Ar	eeway/Dir on contion risdiction nalysis Yealn-Ramp at l	Γ		EB C Caltr	ans D1	np at Katella 12 Without Proje	ect
Inputs						T tuttip ut t	1010111					
Upstream Ad	j Ramp	Terrain Leve	İ									n Adj Ramp
☐ Yes	∏ On										✓ Yes	☑ On ☑ Off
I No	I Off										L _{down} =	1090 ft
L _{up} =	ft				·						1	
Vu =	veh/h	,	S _{FF} = 70		show lane	es, L _A , L _D ,V	, , ,	35.0 mp	h		VD =	170 veh/h
Convers	ion to pc	/h Under	Base	Condi	tions							
(pc/h)	V (Veh/hr)	PHF	Ten		Truck	%Rv		f _{HV}	f		v=V/PHF f _H	v f _p
Freeway	4087	0.87	Lev		6	0	-	971	1.0		4839	
Ramp UpStream	326	0.87	Lev	el	6	0	U.	971	1.0	U	386	
DownStream	170	0.87	Lev	el	6	0	0.	971	1.0	0	201	-
		Merge Areas							Diverge	Areas		
Estimati	on of v ₁₂					Estima	tior	of v ₁	2			
	ation 25-2 or 2 using Equation	•				L _{EQ} = (Ed P _{FD} = us V ₁₂ = pc/	ing E	n 25-8 or		+ (V _F -	V _R)P _{FD}	
Capacity	Checks					Capaci	ity (Checks	>			
	Actua	il Max	imum	LOS	SF?			Actua	ıl	Max	dmum	LOS F?
V	5225	Soo Ev	nibit 25-7	N:	^	V _{FI} =V _i	F		s	ee Ext	nibit 25-14	
V _{FO}	0220	366 EX	IIDIL 23-7	144	U	V ₁₂				440	00:All	
V _{R12}	1977	460	i0:All	N	0	V _{FO} = V _F V _R	-		s	ee Ext	nibit 25-14	
						V _R	,			See Ex	hibit 25-3	
Level of	Service L	Determin	ation (if not l	 F)	Level c	of S	ervice	Dete	rmir	nation (if	not F)
D _R = 5	5.475 + 0.007	34 v _R + 0.007	'8 V ₁₂ - 0.0	00627 L _A				D _R = 4.25	2 + 0.00	086 V ₁	₂ - 0.009 L _D	
D _R = 17.	6 (pc/ m/ln)					D _R =	(pc/ m	n/ln)				
LOS = B (Exhibit 25-4)					LOS=	(Exhib	oit 25-4)				
Speed E	stimation	<u> </u>				Speed	Est	imatio	n			 .
	14 (Exibit 25					D _s =		ibit 25-19			•	
_	2 mph (Exhib	•				_	`	(Exhibit 2	•			
	0 mph (Exhib	•			•	` (Exhibit 2	•					
	1 mph (Exhib	•				· .	•	(Exhibit 2	•			
						·		,	1			

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		RAMP	S AND	RAME	JUN	CTIONS	W	ORKS	HEI	ĒΤ		
General .	Informati	on				Site Int	forn	nation				н
Analyst2 Agency or Co Date Perform Analysis Time	ed Period	ZS LLG Engi 07/14/10 PM Peak	Hour		Ju Ju Ai	eeway/Dir on Inction Irisdiction Inalysis Year	r		El Ca	altrans D1	np at Katella I2 Without Proj	
Project Descr	iption PM Ye	ear 2013 With	out Proje	ct SR-57 I	NB EB O	n-Ramp at I	Katella	3				
Inputs		T										
Upstream Adj	Ramp	Terrain Leve)									m Adj Ramp
F Yes	l⊞ On										☑ Yes	☑ On
™ No	I [™] Off										l≣ No L _{down} =	₩ Off 1090 ft
L _{up} =	ft						·				Gown	
	veh/h	\$	S _{FF} = 70		show lane	es, L _A , L _D ,V		35.0 mp	h		VD =	304 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 _i	_{tV} f _p
Freeway	7498	0.87	el el	6	0	_	971		.00	8877		
Ramp	467	0.87	6	0	0.	971	1	.00	553			
UpStream DownStream	304	.6	0	0	971		1.00	360				
Downoadan	004	0.87 Merge Areas	Lev	Ci .	.0	Diverge Areas						
Estimation	on of v ₁₂					Estima	tior	of V ₁	2	M		
L _{EQ} = (Equa P _{FM} = 0.308 V ₁₂ = 2734	ation 25-2 or 2 using Equatio)			L _{EQ} = (Ec P _{FD} = us V ₁₂ = pc/	ing E	n 25-8 or		(_R + (V _F -	V _R)P _{FD}	
Capacity	Checks					Capaci	ty C	heck	S			
	Actua	Max	imum	LOS	S F?			Actua	al	Мах	imum	LOS F?
.,	0.400					V _{F1} =V _F	=			See Ext	nibit 25-14	
V _{FO}	9430	See Ex	hibit 25-7	No	O	V ₁₂				44(0:All	
V _{R12}	3287	460	00:All	No	0	$V_{FO} = V_{F}$ V_{R}	-				nibit 25-14	
						V _R					hibit 25-3	
Level of					<u> </u>	Level c					ation (il	not F)
"	5.475 + 0.0073	14 v _R + 0.007	78 V ₁₂ - 0.	00627 L _A			ĺ	D _R = 4.25	52 + 0	.0086 V ₁₃	₂ - 0.009 L _D	
$D_R = 27.3$	7 (pc/ m/ln)					D _R = ((pc/ m	/ln)				
LOS = C(Exhibit 25-4)					LOS= ((Exhib	it 25-4)	1			
Speed Es	stimation					Speed Estimation						
M _S = 0.39	90 (Exibit 25-	 -19)			·· 	D _s = (Exhibit 25-19)						
	1 mph (Exhibi	•				S _R = mph (Exhibit 25-19)						
	 8 mph (Exhibi		S ₀ = mph (Exhibit 25-19)									
S= 58.9	9 mph (Exhibi	•				S= r	mph ((Exhibit 2	5-15)			

		RAMP	SAND	RAME	JUN	CTIONS	WC	ORKS	HEE	Т			
General In	formatic	on				Site Inf	form	ation					
Analyst2 Agency or Comp Date Performed Analysis Time P Project Descript	Period	ZS LLG Engli 07/14/10 AM Peak	Hour	et SR-57 S	Ju Ju Ar	eeway/Dir onction risdiction ralysis Year	r		Wi Ca	ltrans D	mp at Katella 12 Without Proje		
Inputs	UON ANTIG	ai 2013 Willi	outriojec	1011-01	30 YVD ()	irixamp at i	Valenc	<u> </u>				• • -	
Upstream Adj R		errain Leve	1		·······				•		Downstrea	m Adj Ramp	
F Yes F	ỗ On										I Yes No	☑ On ☑ Off	
	₫ Off										L _{down} =	1015 ft	
_{-up} = ft	t		70	O made				25 O ma	4.		┨.	405 14	
	eh/h			Sketch (es, L _A , L _D ,V	111	35.0 mp	111		VD =	165 veh/h	
Conversio		h Under	Base (Condi	tions	,					·		
(pc/h)	V (Veh/hr)	PHF	Terr		Truck	%Rv	ļ	f _{HV}		fp	v=V/PHF f _t	IV ^f p	
Freeway	5922	0.87	Lev		6	0		971 971		.00	7011 281		
Ramp UpStream	237	0.87	Lev	eı	6	<u> </u>	0.3	971		.00	201		
DownStream	165	0.87	Lev	el	6	0	0.9	971	1	.00	195		
		Merge Areas	}							ge Area	S		
Estimatio	n of v ₁₂					Estima	tion	of v_1	2				
L _{EQ} = (Equation P _{FM} = 0.342 us V ₁₂ = 2397 po	on 25-2 or 25 sing Equation					L _{EQ} = (Ed P _{FD} = us V ₁₂ = pc/	ing Eq	1 25-8 or			- V _R)P _{FD}		
Capacity (Checks					Capaci	ty C	heck	s				
	Actual	Max	imum	LOS	S F?			Actua	ai	Ma	ximum	LOS F?	
V_{FO}	7292	See Ext	nibit 25-7	No	0	V _{FI} =V _F	F				thibit 25-14		
M	0070	400	IO-AII	\$.T	_	V ₁₂ V _{FO} = V _F	-				:00:All chibit 25-14		
V _{R12}	2678	400	IA:0	No	U	V _R			\dashv	See E	xhibit 25-3		
Level of S	ervice D	etermin	ation (i	if not l	F)	Level c	of Se	ervice	De	termi	nation (if	not F)	
	175 + 0.00734										₁₂ - 0.009 L _D		
•••	(pc/ m/ln)	· ·	12	Α.		l '`	(pc/ m	•			5		
	chibit 25-4)							it 25-4)					
Speed Est	timation					Speed	Esti	matic	n				
~	8 (Exibit 25-	•				D _s = S _R = 1	•	bit 25-19	•				
13								S _R = mph (Exhibit 25-19) S ₀ = mph (Exhibit 25-19)					
v	- `		S = mph (Exhibit 25-15)										
S= 62.3 r	mph (Exhibit	20-14)			Iniversity	<u> </u>		'	.0-10)			Ve	

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		RAMP	S AND	RAM	P JUN	CTIONS	S WO	RKSH	IEET		
General	Informati	on				Site In	form	ation			
Analyst2 Agency or Co Date Perform Analysis Time Project Descr	ed Period	ZS LLG Engi 07/14/10 PM Peak ear 2013 With	Hour	ct SR-57	Ji Ji Ai	reeway/Dir ounction unction urisdiction nalysis Year In-Ramp at	r		Caltrans	Ramp at Katel	
Inputs		^	•							<u> </u>	
Upstream Adj	Ramp	Terrain Leve								Downstre	am Adj Ramp
☐ Yes	∏ On									✓ Yes	⊠ On
I №	□ Off									I≣ No □ =	∭ Off
L _{up} =	ft		2 70	Omah			·	25 0 mmh		L _{down} =	1015 ft
	veh/h			Sketch (es, L _A , L _D ,V		35.0 mph		VD =	394 veh/h
Conversi	on 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	6890	0.87	Lev		6	0	0.9		1.00	8157	
Ramp	449	0.87	Lev	el	6	0	0.9	71	1.00	532	
UpStream DownStream	394	0.87	Lev	rol .	6	0	0.9	71	1.00	466	
DOWNSHEAM	JJ4	Merge Areas		CI	U	-	0.9		iverge Ar		
Estimatio	on of V ₁₂		•		· · · · · · · · · · · · · · · · · · ·	Estima	tion				
L _{EQ} = (Equa P _{FM} = 0.311 V ₁₂ = 2533	V ation 25-2 or 2 using Equatio)			L _{EQ} = (Ec	uation ing Equ	V ₁₂ 25-8 or 2	= V _R + (\	V _F - V _R)P _{FD}	
Capacity	Checks	•				Capaci		hecks			
	Actua	l Max	imum	LOS	F?			Actual		Maximum	LOS F?
						V _{FI} =V _F			See	Exhibit 25-14	
V _{FO}	8689	See Ex	nibit 25-7	No	0	V ₁₂				4400:All	
V _{R12}	3065	460	llA:0	No	0	$V_{FO} = V_{F}$ V_{R}	-			Exhibit 25-14	
						V _R				Exhibit 25-3	
Level of					<u>5) </u>	Level o				nination (i	f not F)
$D_R = 5$.475 + 0.0073	34 v _R + 0.007	'8 V ₁₂ - 0.0	00627 L _A		İ	D	_R = 4.252	+ 0.0086	V ₁₂ - 0.009 L _D	
$D_{R} = 26.0$) (pc/ m/ln)					D _R ≃ (pc/ m/la	n)			
LOS = C (E	xhibit 25-4)					LOS≃ (Exhibit	25-4)			
Speed Es	stimation					Speed	Estir	mation	1	24	
$M_{S} = 0.37$	70 (Exibit 25-	19)				D _s = (Exhibit 25-19)					
S _R = 59.7							S _R = mph (Exhibit 25-19)				
							S ₀ = mph (Exhibit 25-19)				
	mph (Exhibi	-				S= r	nph (E	xhibit 25	15)		

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WEAVING ANALYSIS

<u> </u>	l !£		FREEWA	VI ANCH						
Genera	l Informat	ion			Site Info	rmation			_	
Analyst Agency/Co Date Perfor Analysis Tir	med	07/14	Engineers /10 eak Hour		Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	Location	Orang Caltra	R-57 NB Prangewood On to Katella Caltrans D12 Pear 2013 Without Project		
Inputs		2 (10)		 						
Weaving nu Weaving se Terrain	ee-flow speed, sumber of lanes, g length, L (ft)	N `	65 5 136 <u>Lev</u>	rel .	Weaving type Volume ratio, Weaving ratio	, VR	B 0.19 0.20			
	sions to p	T	1	~		-		1 ,	1	
(pc/h)		PHF	Truck %	RV %	E _T	ER	fhv	fp	V	
Vo1	3899	0.87	6	0	1.5	1.2	0.971	1.00	4616	
Vo2	12	0.87	6	0	1.5	1.2	0.971	1.00	14	
Vw1	754	0.87	6	0	1.5	1.2	0.971	1.00	892	
Vw2	189	0.87	6	0	1.5	1.2	0.971	1.00	223	
Vw	4			1115	Vnw		· i	4630		
V		. 187							5745	
weavin	g and Nor	า-Weavin เ			 					
		Weaving	Unconst		ving (i = nw)	Meavir	Gons g (i = w)	trained	ving (= nw)	
a (Exhibit 2	1-6)	0.0			00	VVCQVII	ig (i – w)	NUITIVEA	vilig (- HVV	
b (Exhibit 2		2.2			00					
c (Exhibit 2	1-6)	0.7)	1.	00					
d (Exhibit 2		0.5			50					
Weaving intens Weaving and n		0.4		0.	18	· · · · · · · · · · · · · · · · · · ·				
vveaving and n speeds, Si (mi/i		53.0	7	61	.59					
Maximum n	anes required f umber of lanes If Nw < Nw	, Nw (max)	•		1.20 3.50	if Nw > Nw	ı (max) constr	ained operati	on	
Weavin	g Segmen	t Speed,	Density,	Level of	Service,	and Cap	acity			
	gment speed, S			59.73						
	gment density,	D (pc/mi/ln)		19.24						
Level of ser				В					_	
	base condition,			11449						
	a 15-minute flo			11116						
	a full-hour volu	ime, c _h (ven/r	1)	9671						
 Capacity con Capacity occi Three-lane Ty Four-lane Ty Capacity cons Five-lane Ty 	ments longer than 2 strained by basic fre ars under constraine ype A segments do no trained by maximum e A segments do no ng segments do no	eway capacity. Id operating condition of operate well at oper	tions. t volume ratios grea volume ratios grea ng flow rate: 2,800 volume ratios grea	eater than 0.45. Po Iter than 0.35. Po pc/h (Type A), 4, Iter than 0.20. Poo	oor operations and s or operations and so 000 (Type B), 3,500 or operations and so	some local queuin me local queuin (Type C). me local queuino	ng are expected in s g are expected in s g are expected in s	such cases. such cases. such cases.		

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Genera	I Informat	tion			Site Info	rmation	•			
Analyst Agency/Co Date Perfo Analysis Ti	rmed	07/14	Engineers /10 eak Hour		Weaving Seg Jurisdiction	Freeway/Dir of Travel Weaving Seg Location Jurisdiction Analysis Year		SR-57 NB Orangewood On to Katella Caltrans D12 Year 2013 Without Project		
Inputs					•		***			
Weaving no Weaving se Terrain	ee-flow speed, umber of lanes, eg length, L (ft)	, N	65 5 136 Lev	el	Weaving type Volume ratio Weaving ratio	, VR	B 0.12 0.38			
Conver	sions to p	oc/h Unde	er Base C	ondition	ıs				<u>.</u>	
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fHV	fp	v	
Vo1	7140	0.87	6	- 0	1.5	1.2	0.971	1.00	8453	
Vo2	15	0.87	6	0	1.5	1.2	0.971	1.00	17	
√w1	590	0.87	6	0	1.5	1.2	0.971	1.00	698	
/w2	359	0.87	6	0	1.5	1.2	0.971	1.00	425	
/w				1123	Vnw			8470		
/	7							9593		
N eavin	g and No	n-Weavin	g Speeds	-					1 0000	
			Unconstr				Cons	trained	···	
		Weaving		Non-Weav	ing (i = nw)	Weavin	g (i = w)		ving (= nw)	
(Exhibit 2		0.08		0.0						
(Exhibit 24 (Exhibit 24		2.20 0.70		6.0				· · · · · · · · · · · · · · · · · · ·		
(Exhibit 2		0.70		1.0 0.9						
Veaving intens		0.55		0.2						
Veaving and no peeds, Si (mi/l		50.4		60.			<u> </u>			
lumber of I Naximum n	anes required fumber of lanes	, Nw (max) (max) uncons	rained operati	Nw on	0.78 3.50	if Nw > Nw	(max) constr	ained operation	on	
Veavin	g Segmen	t Speed,	Density,	Level of	Service,	and Cap	acity			
Veaving se	gment speed, S	S (mi/h)		59.34						
	gment density,	D (pc/mi/ln)		32.33		**				
evel of sen		- / fl \		D			- 7.			
	base condition,			11695						
	a 15-minute flo			11354	· · · · · ·			·		
	a full-hour volu	me, c _h (ven/n)	9878		***				
Capacity cons Capacity occu Three-lane Ty Four-lane Typ Capacity const	nents longer than 25 trained by basic free rs under constrained pe A segments do ro rained by maximum e A segments do no	eway capacity. d operating condit not operate well at ot operate well at allowable weavin	ons. volume ratios grea olume ratios greate	iter than 0.45. Poor or than 0.35. Poor och (Type A), 4.0	or operations and so r operations and so 00 (Type B) 3,500	ome local queuing me local queuing (Type C)	g are expected in are expected in s	such cases. uch cases,		

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Genera	Informat				ING WOF	rmation				
Analyst Agency/Co Date Perfo Analysis Ti	mpany med	ZS LLG E 07/14/	ngineers 10 eak Hour		Freeway/Dir Weaving Seq Jurisdiction	Freeway/Dir of Travel Weaving Seg Location Jurisdiction Analysis Year		SR-57 SB Katella On to Orangewood Caltrans D12 Year 2013 Without Project		
Inputs		0 (:#)	<u></u>							
Weaving no Weaving se Terrain	ee-flow speed, umber of lanes, eg length, L (ft)	N `	65 5 178 Lev	el	Weaving type Volume ratio Weaving rati	, VR	A 0.13 0.17			
Conver	sions to p	oc/h Unde	r Base C	ondition	s					
(pc/h)	V	PHF	Truck %	RV %	Ε _T	E _R	fHV	fp	V	
Vo1	5820	0.87	6	0	1.5	1.2	0.971	1.00	6890	
Vo2	10	0.87	6	0	1.5	1.2	0.971	1.00	11	
Vw1	736	0.87	6	0	1.5	1.2	0.971	1.00	871	
Vw2	150	0.87	6	0	1.5	1.2	0.971	1.00	177	
Vw				1048	Vnw			<u> </u>	6901	
/	7				_#	,			7949	
Weavin	g and No	n-Weavin	g Speeds	3					<u> </u>	
			Unconstr				Cons	trained		
		Weaving		Non-Weav	/ing (i = nw)	Weavin	ıg (i = w)	Non-Wea	ving (= nw)	
a (Exhibit 2		0.15		0.0		<u>'</u>				
(Exhibit 2		2.20		4.1						
c (Exhibit 2 d (Exhibit 2		0.97 0.80		1.3 0.3						
Neaving intens		0.63		0.						
Neaving and n	on-weaving	48.74		57.	****					
Maximum n	anes required tumber of lanes	for unconstrain , Nw (max) (max) unconst	ed operation,	Nw	1.22 1.40		(max) constr	ained operation	on	
Weavin	g Segmer	nt Speed,	Density,	Level of	Service,	and Cap	acity		•	
	gment speed, S	 		55.90						
	gment density,	D (pc/mi/ln)		28.44						
evel of ser			*****	D						
	base condition			11061						
	a 15-minute flo			10739				·		
	a full-hour volu	ime, c _h (veh/h)		9343				·		
Capacity cons Capacity occu Three-lane Ty Four-lane Ty Capacity cons Five-lane Typ	ments longer than 2 strained by basic frea us under constraine ype A segments do no trained by maximum e A segments do no ng segments do no	eway capacity. d operating conditi not operate well at ot operate well at v n allowable weaving ot operate well at v	ons. volume ratios great olume ratios great g flow rate: 2,800 p olume ratios greate ume ratios greate	ater than 0.45. Po er than 0.35. Poo pc/h (Type A), 4,0 er than 0.20. Poor r than 0.80. Poor	or operations and s or operations and so 000 (Type B), 3,500 operations and so	some local queuir ome local queuing (Type C). ome local queuing	ng are expected in safe expected in safe expected in safe	such cases. such cases.		

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			REEWA	Y WEAV	ING WOR	KSHEE				
Genera	l Informat	ion			Site Info	rmation				
Analyst Agency/Cor Date Perfor Analysis Tir	med	07/14/	ngineers 10 ak Hour		Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	Location	SR-57 SB Katella On to Orangewood Off Caltrans D12 Year 2013 Without Project			
Inputs Freeway fre	ee-flow speed, \$	SFF (mi/h)	65				**		 -	
	imber of lanes, eg length, L (ft)	N ,	5 178 Leve		Weaving type Volume ratio, Weaving ratio	, VR	3	A 0.14 0.32		
Conver	sions to p	c/h Unde	r Base C	ondition	S					
(pc/h)	٧	PHF	Truck %	RV %	E _T	E _R	fHV	fp	V	
Vo1	6923	0.87	6	0	1.5	1.2	0.971	1.00	8196	
Vo2	22	0.87	6	0	1.5	1.2	0.971	1.00	26	
Vw1	753	0.87	6	0	1.5	1.2	0.971	1.00	891	
Vw2	353	0.87	6	0	1.5	1.2	0.971	1.00	417	
Vw				1308	Vnw		1	.•	8222	
V					_ i				9530	
Weavin	g and No	n-Weavin	a Speeds	 }						
	<u> </u>		Unconstr				Cons	trained		
		Weaving	(i = w)	Non-Weav	ing (i = nw)	Weavir	ıg (i = w)	Non-Wea	ving (= nw)	
a (Exhibit 2		0.15		0.0						
b (Exhibit 2		2.20		4.0				<u> </u>		
c (Exhibit 2 d (Exhibit 2		0.97 0.80		1.:						
Weaving intens		0.80		0.						
Weaving and n	on-weaving	46.20	·····	54.						
speeds, Si (mi/ Number of i	^{h)} anes required f				1.28			<u> </u>		
Maximum n	umber of lanes	, Nw (max)	•		1.40	₹ ien < N	· (may) agast	rained operati	an	
	g Segmer	` 					<u> </u>	ameu operau	UII	
	gment speed, S		Density,	53.20	OCIVICE,	anu cap	acity			
	gment density,			35.83						
Level of ser		- 12		E				·		
•	base condition	, c _b (pc/h)		11022						
Capacity as	a 15-minute flo	ow rate, c (veh	/h)	10701						
	a full-hour volu			9310						
Notes		п		<u> </u>						
a. Weaving seg b. Capacity con c. Capacity occ d. Three-lane T e. Four-lane Ty f. Capacity con 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 oe A segments do no ing segments do no ng segments do no	eway capacity. ed operating condit not operate well at ot operate well at v n allowable weavin ot operate well at v t operate well at v	ons. volume ratios greated to the ratios gre	ater than 0.45. Poter than 0.35. Poter than 0.35. Poter than 0.20. Poor than 0.80. Poor	oor operations and so or operations and so 000 (Type B), 3,500 or operations and so operations and so	some local queui ome local queuin O (Type C). ome local queuing me local queuing	ng 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.		

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			FREEWA	Y WEAV	ING WOR		<u> </u>			
<u>Genera</u>	l Informat	ion			Site Info	rmation				
Analyst Agency/Co Date Perfor Analysis Tir	med	07/14	Engineers /10 eak Hour		Freeway/Dir of Weaving Seg Jurisdiction Analysis Yea	Location	Caltra	7 NB a On to Ball C ins D12 2013 Without		
Inputs Freeway fre	e-flow speed,	SFF (mi/h)	65					В	.	
Weaving no Weaving se Terrain	imber of lanes, g length, L (ft)	N `	4 213 <u>Le</u> v	el	Weaving type Volume ratio, Weaving ratio	, VR		0.21 0.15		
Conver	sions to p	c/h Unde	er Base C	ondition	s					
(pc/h)	V	PHF	Truck %	RV %	E _T	ER	fHV	fp	٧	
Vo1	3691	0.87	6	0	1.5	1.2	0.971	1.00	4369	
Vo2	10	0.87	6	0	1.5	1.2	0.971	1.00	11	
√w1	854	0.87	6	0	1.5	1.2	0.971	1.00	1011	
√w2	152	0.87	6	0	1.5	1.2	0.971	1.00	179	
Vw				1190	Vnw		•		4380	
V	7					ı			5570	
Weavin	g and No	n-Weavin	g Speeds	3		•				
	<u> </u>	:	Unconstr				Cons	trained		
		Weaving			ving (i = nw)	Weavir	ng (i = w)	Non-Wea	ving (= nw)	
a (Exhibit 2		0.0			00			ļ		
b (Exhibit 2		2.2			00			<u> </u>		
c (Exhibit 2 d (Exhibit 2		0.70		0.	00 50					
Weaving intens		0.4		0.				1	<u></u>	
Neaving and n	on-weaving	53.7		61.						
Maximum n	anes required to umber of lanes	for unconstrai , Nw (max) (max) uncons	ned operation, trained operat	Nw	0.85 3.50		v (max) constr	rained operati	on	
	g Segmer		Density,		Service,	and Cap	acity			
	gment speed,			59.36						
	gment density,	D (pc/mi/ln)		23.46						
Level of ser	base condition	o (no/h)		C -			<u> </u>			
			o /b\	9317						
	a 15-minute flo a full-hour volu			9046 7870						
	a ruir-riour voit	me, of (sent	7	1010						
b. Capacity cor c. Capacity occ d. Three-lane T e. Four-lane Ty f. Capacity con: g. Five-lane Ty h. Type B weav	ments longer than 2 strained by basic for urs under constrain ype A segments do no strained by maximur be A segments do no ing segments do no ng segments do no	eeway capacity. ed operating cond not operate well a tot operate well at n allowable weavi ot operate well at t operate well at	itions. It volume ratios grea volume ratios grea ng flow rate: 2,800 volume ratios great olume ratios greate	ater than 0.45. Poter than 0.35. Poter than 0.35. Poter than 0.20. Poter than 0.80. Poor	oor operations and so or operations and so 000 (Type B), 3,500 or operations and so operations and so	some local queui ome local queuin O (Type C). ome local queuing me local queuing	ng are expected in g are expected in g are expected in s are expected in s	such cases. such cases. such cases. uch cases.		

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Camana	 		REEWA	Y WEAV	ING WOF		<u> </u>		
Genera	Informat	uon			Site Info	rmation	· ·		.
Analyst Agency/Cor Date Perfon Analysis Tin	med	07/14/	ngineers 10 ak Hour	71441	Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	Location	Caltra	7 NB a On to Ball C ans D12 2013 Without	
nputs									
Weaving nu	e-flow speed, a mber of lanes, g length, L (ft)		65 4 213 Leve		Weaving type Volume ratio Weaving ratio	, VR		B 0.: 0.:	
Conver	sions to p	c/h Unde	r Base C	ondition	S		·		•
(pc/h)		PHF	Truck %	RV %	E _T	ER	fHV	fp	٧
√o1	7350	0.87	6	0	1.5	1.2	0.971	1.00	8701
/o2	15	0.87	6	0	1.5	1.2	0.971	1.00	17
√w1	726	0.87	6	0	1.5	1.2	0.971	1.00	859
/w2	258	0.87	6	0	1.5	1.2	0.971	1.00	305
/w				1164	Vnw	,			8718
/									9882
Veavin	g and No	n-Weaving	Speeds	;	··				
	<u> </u>		Unconstr	******			Cons	trained	
		Weaving	(i = w)	Non-Weav	ing (i = nw)	Weavir	ıg (i = w)	Non-Wea	ving (= nw
(Exhibit 24		0.08		0.0			'		
Exhibit 24		2.20		6.0					
(Exhibit 24 I (Exhibit 24		0.70 0.50		1.0				<u> </u>	
Veaving intensi		0.53		0.2					
Veaving and no	n-weaving	51.06	1	60.					
speeds, Si (mi/h Vumber of I:		for unconstrain			0.43		·	<u> </u>	
	umber of lanes		od oporation,		3.50				
J	☑ If Nw < Nw	(max) unconst	rained operati	on	鼓	if Nw > Nw	r (max) constr	ained operati	on
Neavin	g Segmer	nt Speed,	Density,	Level of	Service,	and Cap	acity		
Veaving seg	gment speed, S	S (mi/h)		59.21					•
	gment density,	D (pc/mi/ln)		41.72					
evel of sen	•	f 0.3		Е			•		
	base condition	-		9400		<u> </u>			
		ow rate, c (veh		9126					
	a tull-hour volu	ıme, c _h (veh/h)		7940					
Capacity cons Capacity occu Three-lane Ty Four-lane Typ Capacity cons Five-lane Typ Type B weavi	strained by basic fre irs under constraine the A segments do not trained by maximum e A segments do no e A segments do no	ed operating conditi not operate well at voor ot operate well at voor n allowable weaving ot operate well at voor t operate well at voor	ons. volume ratios great olume ratios great g flow rate: 2,800 p olume ratios greate ume ratios greate	ater than 0.45. Po er than 0.35. Poo pc/h (Type A), 4,0 er than 0.20. Poor r than 0.80. Poor	or operations and so r operations and so 00 (Type B), 3,500 r operations and so operations and so	some local queuir ome local queuirq I (Type C). ome local queuirq ne local queuirq	ng are expected in are expected in are expected in sare expected in sa	such cases. such cases. such cases. uch cases.	

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			FREEWA	Y WEAL	/ING WOF		T		
Genera	Informat	ion			Site Info	rmation			
Analyst Agency/Cor Date Perfon Analysis Tin	ned	07/14/	ngineers 10 eak Hour	J	Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	Location	Caltra	7 SB In to Katella C Ins D12 2013 Without	
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.: 0.4	
Conver	sions to p	c/h Unde	r Base C	ondition	าร	17201			
(pc/h)	٧	PHF	Truck %	RV %	E _T	ER	fHV	fp	٧
Vo1	5313	0.87	6	0	1.5	1.2	0.971	1.00	6290
Vo2	30	0.87	6	0	1.5	1.2	0.971	1.00	35
Vw1	850	0.87	6	0	1.5	1.2	0.971	1.00	1006
Vw2	609	0.87	6	0	1.5	1.2	0.971	1.00	721
Vw		•		1727	Vnw				6325
V	1				•	•			8052
Weavin	g and No	n-Weavin	g Speeds	 3					.I
			Unconstr				Cons	trained	
		Weaving		1	ving (i = nw)	Weavir	ng (i = w)	Non-Wea	ving (= nv
a (Exhibit 24		0.08		·	.00			ļ	
b (Exhibit 24 c (Exhibit 24		2.20			.00			 	
d (Exhibit 24		0.70		}	.50				
Weaving intensi		0.51		 	.26				
Weaving and no speeds, Si (mi/h		51.5	4	58	3.69				
		for unconstrair	ed operation,	. Nw	0.81			1	
	ımber of lanes		•		3.50				
		(max) unconsi	•				v (max) constr	ained operati	on
	 		Density,		f Service,	and Cap	acity		
	gment speed,		•	56.99					
Weaving se Level of ser	gment density,	ט (pc/mi/in)		35.32 E					·····
	pase condition	c. (nc/h)		9331					
		ow rate, c (veh	/h)	9059				······································	
		ume, c _h (veh/h		7881	<u></u>	· · · · · · · · · · · · · · · · · · ·			
Notes	S THE HOUL TOR	and, oh (some	,	7001					
	nents longer than 2	500 ft. are treated	as isolated merce	and diverge are	as using the proced	ures of Chapter 2	5, *Ramps and Ra	amp Junctions*	
b. Capacity cons c. Capacity occu	trained by basic from	eway capacity. ed operating condit	ions.	·	oor operations and	•	,	•	

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.

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

E. 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.

E. 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.

E. 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.

 $HCS2000^{\text{TM}}$

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Analyst ZS Agency/Company LLG Engineers Weav Date Performed 07/14/10 Jurisd Analysis Time Period PM Peak Hour Analy Inputs Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 4 Weaving seg length L (ff) 2490	g type e ratio, VR g ratio, R E R 1.2 1.2	SR-57 Ball C Caltra Year 2 fHV 0.971 0.971	On to Katella Cans D12 2013 Without B 0. 0.4	Project
Agency/Company	g Seg Location stion s Year g type e ratio, VR g ratio, R E R 1.2 1.2 1.2	### Ball C Caltra Year 2 ### FHV 0.971 0.971 0.971	On to Katella Cans D12 2013 Without B 0. 0.4	Project 16 43
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 4 Volum Weaving seg length, L (ft) 2490 Level Weaving seg length, L (ft) 2490 Level Weaving seg length, L (ft) 2490 Level Weaving Segment Speed, S (mi/h) Meaving Segment density, D (pc/mi/ln) 58.76 Meaving segment density, D (pc/mi/ln) 58.76 Meaving segment density, D (pc/mi/ln) 38.26 Meaving segment density, D (pc/mi/ln) 38.26 Meaving segment density, D (pc/mi/ln) 38.26 Meaving segment density, D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment density D (pc/mi/ln) Meaving segment	e ratio, VR g ratio, R E R 1.2 1.2 1.2	0.971 0.971 0.971	0.4 0.4 fp - 1.00	43
Weaving number of lanes, N	e ratio, VR g ratio, R E R 1.2 1.2 1.2	0.971 0.971 0.971	0.4 0.4 fp - 1.00	43
V	1.2 1.2 1.2	0.971 0.971 0.971	1.00	v
Vo1 6376 0.87 6 0 1.	1.2 1.2 1.2	0.971 0.971 0.971	1.00	V
Vo2 30 0.87 6 0 1.	1.2 1.2 1.2	0.971 0.971		
Ww1 680 0.87 6 0 1 Ww2 511 0.87 6 0 1 Www 1409 Vnw Weaving Speeds Unconstrained Weaving (i = w) Non-Weaving (i = w) A (Exhibit 24-6) 0.08 0.00 C (Exhibit 24-6) 0.70 1.00 C (Exhibit 24-6) 0.50 0.50 Meaving intensity factor, Wi 0.49 0.22 Neaving and non-weaving speeds, Si (mi/h) 51.91 60.24 Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 Meaving Segment Speed, Density, Level of Serval Neaving segment speed, S (mi/h) 58.76 Neaving segment density, D (pc/mi/ln) 38.26	1.2	0.971		7548
Vw		+	1.00	35
Weaving and Non-Weaving Speeds Unconstrained Weaving (i = w) Non-Weaving (i = a (Exhibit 24-6) 0.08 0.00	1.2	0.074	1.00	805
Weaving and Non-Weaving Speeds Unconstrained Weaving (i = w) Non-Weaving (i = a (Exhibit 24-6) 0.08 0.00 0.		0.971	1.00	604
Unconstrained Weaving (i = w) Non-Weaving (i = a (Exhibit 24-6) 0.08 0.00			.1	7583
Unconstrained Weaving (i = w) Non-Weaving (i = a (Exhibit 24-6) 0.08 0.00			•	8992
Unconstrained Weaving (i = w) Non-Weaving (i = a (Exhibit 24-6) 0.08 0.00				_
a (Exhibit 24-6) 0.08 0.00 b (Exhibit 24-6) 2.20 6.00 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 51.91 60.24 Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 Weaving Segment Speed, Density, Level of Service Weaving segment speed, S (mi/h) 58.76 Weaving segment density, D (pc/mi/ln) 38.26		Cons	trained	
b (Exhibit 24-6) 2.20 6.00 c (Exhibit 24-6) 0.70 1.00 d (Exhibit 24-6) 0.50 0.50 Neaving intensity factor, Wi 0.49 0.22 Neaving and non-weaving 51.91 60.24 Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 ■ If Nw < Nw(max) unconstrained operation Weaving Segment Speed, Density, Level of Serve Weaving segment speed, S (mi/h) 58.76 Neaving segment density, D (pc/mi/ln) 38.26	w) Weav	ing (i = w)	Non-Wea	ving (= nw)
C (Exhibit 24-6) 0.70 1.00 2 (Exhibit 24-6) 0.50 0.50 Neaving intensity factor, Wi 0.49 0.22 Neaving and non-weaving peeds, Si (mi/h) 51.91 60.24 Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 ■ If Nw < Nw(max) unconstrained operation Weaving Segment Speed, Density, Level of Serve Neaving segment speed, S (mi/h) 58.76 Neaving segment density, D (pc/mi/ln) 38.26			 	
A (Exhibit 24-6) 0.50 0.50 Neaving intensity factor, Wi 0.49 0.22 Neaving and non-weaving 51.91 60.24 Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 If Nw < Nw(max) unconstrained operation Weaving Segment Speed, Density, Level of Serval Neaving segment speed, S (mi/h) 58.76 Neaving segment density, D (pc/mi/ln) 38.26				
Meaving intensity factor, Wi 0.49 0.22 Meaving and non-weaving 51.91 60.24 Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 If Nw < Nw(max) unconstrained operation Meaving Segment Speed, Density, Level of Servation Segment speed, S (mi/h) 58.76 Meaving segment density, D (pc/mi/ln) 38.26			1	-
Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 If Nw < Nw(max) unconstrained operation Weaving Segment Speed, Density, Level of Serv Meaving segment speed, S (mi/h) 58.76 Meaving segment density, D (pc/mi/ln) 38.26			 	
Number of lanes required for unconstrained operation, Nw 0.56 Maximum number of lanes, Nw (max) 3.50 If Nw < Nw(max) unconstrained operation Weaving Segment Speed, Density, Level of Server Neaving segment speed, S (mi/h) 58.76 Meaving segment density, D (pc/mi/ln) 38.26			1	
Neaving segment speed, S (mi/h)58.76Neaving segment density, D (pc/mi/ln)38.26	☐ if Nw > N	lw (max) constr	rained operati	on
Neaving segment density, D (pc/mi/ln) 38.26	ce, and Ca	pacity		
Eval of satisfies, EOS .				
			·····	
<u> </u>				
Capacity as a 15-minute flow rate, c (veh/h) 9126 Capacity as a full-hour volume, c _h (veh/h) 7940				
		·	·	
Notes		-25 *Domné and Do	amo Junctione"	

- 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.
 f. 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.

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APPENDIX N-II

YEAR 2013 WITH PROJECT TRAFFIC CONDITIONS –
CALTRANS FREEWAY RAMP ANALYSIS (HCM
METHODOLOGY)

Merge/Diverge Analysis

		RAMP	S AND	RAMI	P JUN	CTIONS	WOR	KSHE	ET		
General	Informati	on	-			Site Int	format	tion			
	ned	ZS LLG Engi 07/14/10 AM Peak ear 2013 With	Hour	5 NB On-	Ju Ju Ar	reeway/Dir o unction urisdiction nalysis Year Katella		0	5 NB n-Ramp a altrans D ear 2013		
Inputs											
Upstream Ad	lj Ramp	Terrain Leve	l			÷					m Adj Ramp
☑ Yes	☑ On É									₩ Yes	□ On □ Off
™ No	ि Off									L _{down} =	ft
L _{up} =	1400 ft									4	·
	262 veh/h			Sketch (s, L _A , L _D ,V	S _{FR} = 35 _R ,V _t)	.0 mph		VD =	veh/h
Convers	ion to pc	h Under	Base	Condi	tions					· · · · · · · · · · · · · · · · · · ·	
(pc/h)	(Veh/hr)	PHF	Ter		Truck	%Rv	f _{HV}		f _p	v=V/PHF f	_{IV} f _p
Freeway	4828	0.90	Lev		9	0	0.957		1.00	5606 252	
Ramp UpStream	217 262	0.90	Lev		9	0	0.957		1.00	252	
DownStream		0.90	Lev	EI	9	0	0.957		1.00	304	
Downoucun		Merge Areas			<u> </u>		<u> </u>	Dive	rge Areas		
Estimati	on of v ₁₂					Estima	tion o				
L _{EQ} = (Equ	V nation 25-2 or 2 using Equatio)			$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} = \text{ (Equation 25-8 or 25-9)}$ $P_{FD} = \text{ using Equation}$ $V_{12} = \text{ pc/h}$					
	/ Checks					Capaci		ecks			-
<u> </u>	Actua	I Max	imum	· LOS	S F?			Actual	Max	kimum	LOS F?
						V _{FI} =V _f			 	nibit 25-14	
V _{FO}	5858	See Ex	nibit 25-7	N	0	V ₁₂				00:All	
V _{R12}	2189	460	0:All	No	0	$V_{FO} = V_{F}$ V_{R}	-		•	hibit 25-14	
						V _R			<u> </u>	hibit 25-3	
	Service L					Level c				nation (in	not F)
D _R =			• • • • • • • • • • • • • • • • • • • •		0.0086 V ₁	₂ - 0.009 L _D					
D _R = 19.		l "	pc/ m/ln)								
LOS = B(LOS= (Exhibit 25-4)									
Speed E	stimation					Speed	Estim	ation			
M _s = 0.3	321 (Exibit 25	-19)				D _s = (Exhibit 25-19)					
1	.0 mph (Exhib	it 25-19)				S _R = mph (Exhibit 25-19)					
1	.2 mph (Exhibi	•				S ₀ = 1	nph (Ex	hibit 25-19	€)		
	.6 mph (Exhibi	•				S = mph (Exhibit 25-15)					

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		RAMP	S AND	RAM	P JUN	CTIONS	S W	ORKS	HE	ET		
*****	Informati					Site In	forn	natior	7			· · · · · · · · · · · · · · · · · · ·
Analyst2 Agency or Co Date Perform Analysis Timo Project Desco	ned	ZS LLG Engi 07/14/10 PM Peak ear 2013 With	Hour	-5 NR On	Ju Ju Ai	reeway/Dir on unction urisdiction nalysis Yea Katella		vel	C	altrans D	at Katella 112 With Project	
Inputs	iibaou i m	ear 2015 Will	i i ioject i	O ND OII	rvamp ac	Natella						
Upstream Ad	j Ramp	Terrain Leve	el	•						<u> </u>	Downstrea	m Adj Ramp
I Yes	☑ On										Yes	□ On
I≣ No	l⊞ Off										I⊠ No L _{down} =	l⊞ Off ft
L _{up} =	1400 ft											
Vu =	377 veh/h		S _{FF} = 70		show lane	es, L _A , L _D ,V		35.0 mp	oh		Vo =	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 _t	_{IV} f _p
Freeway Ramp	7471 321	0.90 0.90	Lev Lev		9	0	_	957 057		1.00	8675	
UpStream	377	0.90	Lev		9	0	-	957 957		1.00 1.00	373 438	
DownStream	***************************************			-			Ť				-	
	****	Merge Areas								rge Area	S	·
Estimation	on of v ₁₂				:	Estima	tior	of v ₁	2			
	ation 25-2 or 2 using Equatio	•				L _{EQ} = (Ec P _{FD} = us V ₁₂ = pc/	ing E	n 25-8 oı			- V _R)P _{FD}	
Capacity	Checks					Capaci	ty (heck	s			
	Actua	l Max	imum	LOS	F?			Actua	al	Ma	ximum	LOS F?
V _{FO}	9048	See Ex	nibit 25-7	No)	V _{FI} =V _F	:				hibit 25-14 00:All	
V _{R12}	3240	460	0:All	No)	$V_{FO} = V_F$ V_R	-		:		hibit 25-14	
			. :	٠		V_R				See Ex	khibit 25-3	
Level of	Service L	Determin	ation (if not l	5)	Level o	of Se	ervice	De	termi	nation (if	not F)
$D_R = 6$	5.475 + 0.0073	34 v _R + 0.007	8 V ₁₂ - 0.0	00627 L _A				$O_{R} = 4.25$	52 + 0	.0086 V	₁₂ - 0.009 L _D	
$D_R = 27.4$	4 (pc/ m/ln)				:	D _R = (pc/ m	/ln)				
LOS = C (Exhibit 25-4)					LOS= (Exhib	it 25-4)				
Speed Es	stimation					Speed	Esti	matic	n			
M _S = 0.38	86 (Exibit 25-	-19)				D _s =	(Exhi	bit 25-19	9)			
-	2 mph (Exhibi					l	nph (Exhibit 2	5-19)			
	8 mph (Exhibi	•				S ₀ = r	nph	(Exhibit :	25-19)		
	6 mph (Exhibi	-				S= r	nph (Exhibit 2	5-15)			
ooTM			Commission.	- @ 2000 T		f Florida All	n: 1.	D 1				Version

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		RAM	PS AN	D RAM	JUNC	TIONS V	VOR	KSHEE	T		*****	
General Info	rmation				te Infor				- "			
Analyst	••	ZS			Fre	eway/Di	r of	Travel	I-5	SB		
Agency or Co	mpany	LLG Eng	ineers	S		nction					at Kate	ella
Date Perform	ed	07/14/10			Ju	risdiction				ltrans Î		
Analysis Time	Period	AM Peak	Hou	•	An	alysis Ye	ar		Ye	ar 2013	3 With F	roject
Project Descr	iption AM	Year 2013	3 With	Project I-	-5 SB O	ff-Ramp	at K	atella				
Inputs												
Upstream Adj	·	Terrain Le	evel								Downstr Ramp	eam Adj
	On										□ Yes	M On
I≣ No I⊠	Off										I≅ No	© Off
$L_{up} = 11$	30 ft			70.0 1							L _{down} =	ft
51	4	S		70.0 mpl				= 35.0	mph		VD =	veh/h
	4 veh/h				show lar	nes, L _A , L	. _D ,V	$_{R}$, V_{f})			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	VC1011
Conversion t	o pc/h Un	der Base (Condit	ons		•						
(pc/h)	V (Veh/hr)	PHF	Te	rrain	Truck	%Rv		f _{HV}		fp	v=V/PHI f _{HV} f _p	=
Freeway	5735	0.90	Le	vel	9	0	0.	.957	1.	.00	6659	
Ramp	647	0.90	Le	vel	9	0	0.	.957	1.	.00	751	
UpStream	514	0.90	Le	vel	9	0	0.	.957	1.	.00	597	
DownStream												
	Me	rge Areas							Diver	ge Area	S	
Estimation of	f v ₁₂					Estimat	ion	of V ₁₂				
	V ₁₂ =	V _F (P _{FM})						V,	, = V	ъ + (V _г	- V _R)P _{ED}	
L _{EQ} = (Equat						L _{EQ} = (E	aua	•	_		R/ FU	
P _{FM} = using E		,				$P_{FD} = 0.1$						
V ₁₂ = pc/h	quation					1		_	Lyua	iliOH V		
	- oko					$V_{12} = 20$		-				
Capacity Che	Actual	Maxim		LOS	го Т	Capacit	<i>y Ci</i>			Managin	1	100 52
	Actual	1			<u> </u>	\	\dashv	Actua	'' - -	Maxir		LOS F?
V_{FO}		See Exhi	bit 25-			V _{FI} =V _F	_	5661		960		No
		7				V ₁₂		2028		4400):All	No
V _{R12}		4600	All			$V_{FO} = V_{R}$	F -	4910		960	0	No
						V_R		751		380	0	No
Level of Serv	ice Detern	nination (ii	not F)		Level of Service Determination (if not F)						7)
D _R = 5.475 +	- 0.00734 v	R + 0.0078	3 V ₁₂ -	0.00627	L _A		D	= 4.252	2 + 0.	.0086 V	₁₂ - 0.009	€ L _D
$D_R = (pc/mi/ln)$ $D_R = 2.8 (pc/mi/ln)$												
LOS = (Exhibit 25-4)												
Speed Estima	ation					Speed E	stir	nation				
M _s = (Exibi	t 25-19)					D _s =	0.49	96 (Exhi	bit 2	5-19)		
S _R = mph (Exhibit 25-19) S _R = 56.1 mph (Exhibit 25-19)												
	(Exhibit 25	-						omph (
	(Exhibit 25-	•				-		2 mph (
o- IIIpii	/vilinit 50.	· · · · ·				Florida All				JIL ZÜ" IC	'/	Vario

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		RAIV	IPS AN	ID RAME	JUNC	TIONS W	ORKSI	IEET				
General Info	rmation			Si	te Infor	mation						
Analyst		ZS			Fre	eway/Dir	of Trav	el I	-5 SB			
Agency or Co	mpany	LLG Eng	gineer	5	Jui	nction		(Off-Ram	p at Kate	ella	
Date Perform	ed	07/14/10			Jui	risdiction			Caltrans			
Analysis Time	Period	PM Peak	Hour		An	alysis Ye	ar		Year 201		Project	
Project Descr	iption PM	Year 201	3 With	Project I-				а			20,000	
Inputs												
Upstream Ad	Ramp	Terrain Le	evel							Downst Ramp	ream Adj	
Yes 🗏	On									∭ Yes	∭ On	
□ No 🔻	Off	Ŋ.								⊠ No	™ Off	
L _{up} = 11	30 ft			70 0 mm	720 000 1			T. O	I	L _{down} =	ft	
Vu = 47	4 veh/h	3	• •	70.0 mph			FR = 3		n	VD =	veh/h	
					how lar	nes, L _A , L	$_{\mathrm{D}}, \mathrm{V_{R}}, \mathrm{V_{f}})$				VCII/II	
Conversion t	o pc/h Une	der Base (Condit	ons								
(pc/h)	V (Veh/hr)	PHF	Te	rrain	Truck	%Rv	f _{HV}		fp	v=V/PH f _{HV} f _p	F	
Freeway	7121	0.90	Le	vel	9	0	0.957		1.00	8268		
Ramp	250	0.90		vel	9	0	0.957		1.00	290		
UpStream	474	0.90		vel	9	0	0.957		1.00	550		
DownStream		0.50	1.00	VCI		-	0.937		1.00	330		
Dominoa can.		rge Areas						Div#	erge Area	<u> </u>		
Estimation o		1907.11000				Estimati	on of v		sige Alec	<u> </u>		
		V _F (P _{FM})							V _R + (V _F	- V _D)P _{ED}		
L _{EQ} = (Equat	ion 25-2 or	25-3)				L _{EQ} = (E	quation			10 12	,	
P _{FM} = using E	•	·										
	quomon					P _{FD} =0.260 using Equation 0						
V ₁₂ = pc/h						$V_{12} = 19$						
Capacity Che			****			Capacity						
	Actual	Maxin	num	LOS	F?		Ac	tual	Maxi	mum	LOS F?	
V_{FO}		See Exh	ibit 25-			V _{FI} =V _F	66	15	96	00	No	
*FO	<u> </u>	7				V ₁₂	_	34	4400	D:All	No	
V _{R12}		4600	:All			$V_{FO} = V_{F}$ V_{R}	63	25	960	00	No	
						V_{R}	29	90	380	00	No	
Level of Serv	ice Detern	ination (i	not F)		Level of Service Determination (if not F)						
$D_{R} = 5.475 +$	· 0.00734 v	R + 0.0078	8 V ₁₂ -	0.00627	LA		$D_R = 4$	252 +	0.0086 V	12 - 0.009	9 L _D	
$D_R = (pc/m)$	•					$D_R = 2.0$ (pc/ mi /ln)						
LOS = (Exhil						LOS= 1	A (Exhik	oit 25-4	·)			
Speed Estima	ation					Speed E	stimatic	on				
M _s = (Exibi	t 25-19)					D _s = ().454 (E	xhibit	25-19)			
•	Exhibit 25-	19)							nibit 25-19	9)	•	
	(Exhibit 25-	•					_		nibit 25-19	-		
	Exhibit 25-					_	_		ibit 25-1	-		
nooTM		· · · · · · · · · · · · · · · · · · ·						- \-~		-,		

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		RAMP	S AND	RAMI	P JUN	CTIONS	S W	ORKS	HE	ET		
General	Informati	on				Site In	forn	natio	7			
Analyst2 Agency or Co Date Perform Analysis Tim	ied	ZS LLG Engi 07/14/10 AM Peak			Ju Ju	eeway/Dir onction Inction Irisdiction Inalysis Year		vel	E C	altrans D	np at Katella 12 With Project	
Project Desc	ription AM Ye	ear 2013 With	n Project S	R-57 NB	EB On-R	amp at Kate	ella					
Inputs			·									
Upstream Ad	j Ramp	Terrain Leve	ei								Downstrea	m Adj Ramp
∭ Yes	∭ On										✓ Yes	™ On
™ No	□ Off										∭ No	□ Off
L _{up} =	ft		2 - 70	0 mah				25.0			L _{down} =	1090 ft
Vu =	veh/h	•	S _{FF} = 70		show lane	es, L _A , L _D ,V		35.0 m	pn 		VD =	170 veh/h
Convers	ion to pc	h Under	Base	Condi	tions							
(pc/h)	V (Veh/hr)	PHF	Ten		Truck	%Rv		f _{HV}		f _p	v=V/PHF f	_{IV} f _p
Freeway	4087	0.87	Lev		6	0		971		1.00	4839	
Ramp UpStream	311	0.87	Lev	el	6	0	0.	971		1.00	368	
DownStream	170	6	0	0.	971		1.00	201				
		0.87 Merge Areas	Lev	<u></u>	<u> </u>				Dive	rge Areas		
Estimati	on of v ₁₂					Estima	tior	of v	12			
	ation 25-2 or 2 using Equatio					L _{EQ} = (Eq P _{FD} = us V ₁₂ = pc/	ing E			V _R + (V _F -	· V _R)P _{fD}	
Capacity	Checks					Capaci	ty C	heck	S			
	Actua	I Max	imum	LOS	S F?			Actu	al	Max	ximum	LOS F?
V	E207	Con Tu	L:L:4.0E 7		_	V _{FI} =V _F	=			See Ex	hibit 25-14	
V _{FO}	5207	266 EX	hibit 25-7	No		V ₁₂				44	00:All	
V _{R12}	1970	460	00:Ali	No	0	$V_{FO} = V_{F}$ V_{R}	-				hibit 25-14	
						V _R				<u> </u>	chibit 25-3	
	Service E				F)	Level o					nation (ii	not F)
• • • • • • • • • • • • • • • • • • • •	5.475 + 0.0073	34 v _R + 0.007	'8 V ₁₂ - 0.0	00627 L _A				••	52 + (0.0086 V ₁	₂ - 0.009 L _D	
D _R = 17.		D _R = (pc/ m/ln)										
LOS = B(LOS= (Exhibit 25-4)										
Speed E	peed Estimation							imatic	on	Y		
M _S = 0.3	14 (Exibit 25-	19)	•			D _s =	(Exh	ibit 25-1	9)			
S _R = 61.	2 mph (Exhibi	t 25-19)				S _R = mph (Exhibit 25-19)						
S ₀ = 66.	0 mph (Exhibi					S ₀ = r	nph	(Exhibit	25-19))		
	1 mph (Exhibi	t 25-14)				S = mph (Exhibit 25-15)						:

		RAMP	S AND	RAM	P JUN	CTIONS	S W	ORKS	HE	ET		
General	Informati	on				Site In	forn	natio	7			
	ed	ZS LLG Engi 07/14/10 PM Peak ear 2013 Witl	Hour_	SR-57 NB	Ju Ju Ai	reeway/Dir Inction Irisdiction nalysis Yea amp at Kat	r	vel	E	altrans D1	np at Katella 12 With Project	
inputs								·				
Upstream Ad	j Ramp	Terrain Leve	el							•	Downstrea	m Adj Ramp
∀es	□ On										✓ Yes	⊠ On
I No	l⊞ Off										Mo L _{down} =	I Off 1090 ft
L _{up} =	ft										down	
Vu =	veh/h		S _{FF} = 70		show lane	s, L _A , L _D ,V		35.0 m	ph		V _D =	304 veh/h
Convers	ion to pc	h Under	Base	Condi	tions						•	
(pc/h)	V (Veh/hr)	PHF		rain	Truck	%Rv		f _{HV}		fp	v=V/PHF f	_{IV} ^f p
Freeway	7498	0.87	Lev		6	0	-	971		1.00	8877	
Ramp UpStream	444	0.87	Lev	el	6	0	0.	971		1.00	526	
DownStream	304	6	0	n	971		1.00	360				
		0.87 Merge Areas	Lev				<u> </u>	011		rge Areas	000	
Estimation	on of v ₁₂		•			Estima	tior	of v				
L _{EQ} = (Equa P _{FM} = 0.311 V ₁₂ = 2764	ation 25-2 or 2 using Equatio pc/h)			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	ty (Check	S			
	Actua	l Max	imum	LOS	S F?			Actu	al	Max	imum	LOS F?
٧/	9403	Con Evi	SEE OF 7	K1.		V _{FI} =V _F	-			See Exh	ibit 25-14	
V _{FO}	9403	See Ex	nibît 25-7	No)	V ₁₂				440	0:All	
V _{R12}	3290	460	0:All	No	oʻ	$V_{FO} = V_F$ V_R	-				ibit 25-14	
						V _R					nibit 25-3	
	Service D				5)	Level o					ation (il	not F)
• • •	5.475 + 0.0073	4 v _R + 0.007	8 V ₁₂ - 0.0	00627 L _A					52 + ().0086 V ₁₂	- 0.009 L _D	
$D_{R} = 27.8$		$D_R = ($	pc/ m	/ln)								
LOS = C(E		LOS= (Exhib	it 25-4)								
Speed Es	peed Estimation							imatic	on	·		
•	91 (Exibit 25-	•				D _s =	•	ibit 25-19	•			
• • •	l mph (Exhibi	•				S_R = mph (Exhibit 25-19) S_0 = mph (Exhibit 25-19)						
•	9 mph (Exhibit	-			1	•	-	•		•		
S= 59.0	mph (Exhibit	(25-14)				S = mph (Exhibit 25-15)						

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		RAMP	S AND	RAM	P JUN	CTIONS	W	ORKS	HE	ET		
General	Informati	ion				Site Inf	orn	natior	7			
Analyst2 Agency or Co Date Perform Analysis Time	ed	ZS LLG Engi 07/14/10 AM Peak			Ju Ju	eeway/Dir onction risdiction nalysis Year		vel	W C	aitrans D	ımp at Katelli 12 With Project	
Project Descr	iption AM Y	ear 2013 With	Project S	R-57 SB	WB On-R	tamp at Kat	ella			,,		
Inputs											<u></u>	
Upstream Ad	j Ramp	Terrain Leve	l									ım Adj Ramp
Yes	I On										☑ Yes ☑ No	☑ On ☑ Off
I₹ No	I Off										L _{down} =	1015 ft
L _{up} =	ft											
Vu =	veh/h		S _{FF} = 70		show lane	S s, L _A , L _D ,V _I		35.0 m	ph		V _D =	165 veh/h
Convers	ion 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	5922	0.87	Lev		6	0		971		1.00	7011	······································
Ramp	268	0.87	Lev	el	6	0	0.9	971	ļ	1.00	317	
UpStream DownStream	165	6	0	0.5	971	┢	1.00	195				
DOWNCECAN	1 100	0.87 Merge Areas	Lev	01		·	0		<u> </u>	rge Areas		
Estimati	on of V ₁₂					Estima	tion	of v		<u></u>		
	V ation 25-2 or 2 using Equatio	/ ₁₂ = V _F (P _{FM} 25-3))			L _{EQ} = (Eq P _{FD} = usi V ₁₂ = pc/l	ing Ed	n 25-8 o		/ _R + (V _F ·	- V _R)P _{FD}	
Capacity	Checks					Capaci	ty C	heck	(S		•	
	Actua	al Max	imum	LOS	S F?			Actu	ıal	Ма	ximum	LOS F?
						V _{FI} =V _F	-			See Ex	hibit 25-14	
V _{FO}	7328	See Ex	hibit 25-7	N	0	V ₁₂			,	44	:00:All	
V _{R12}	2683	460	00:All	N	0	$V_{FO} = V_{F}$ V_{R}	-				hibit 25-14	
	<u>l</u>					V _R				<u> </u>	xhibit 25-3	
Level of	Service I	Determin	ation (if not i	<u>F) </u>	Level o					nation (i	
D _R = {	5.475 + 0.007			I	$D_{R} = 4.2$!52 + ().0086 V.	₁₂ - 0.009 L _D				
$D_R = 23.$	1 (pc/ m/ln)		D _R = ((pc/ m	/ln)							
LOS = C(LOS= (Exhib	oit 25-4)									
Speed E	Speed	Est	imati	on								
M _S = 0.3	43 (Exibit 25	5-19)				D _s =	(Exhi	ibit 25-1	9)			
ł -	4 mph (Exhib	oit 25-19)				S _R = r	mph ((Exhibit	25-19)		•
1	3 mph (Exhib	-				S ₀ = mph (Exhibit 25-19)						
	2 mph (Exhib	•				S = mph (Exhibit 25-15)						

RAMPS AND RAMP JUNCTIONS WORKSHEI General Information Analyst2 75 Francy (Direct Transport)										ET		
	Informat	ion				Site In:	forn	natio	7			
Analyst2 Agency or Co Date Perform Analysis Time Project Descr	ed Period	ZS LLG Engi 07/14/10 PM Peak ear 2013 With	Hour	SR-57 SB	Ju Ju Ai	reeway/Dir Inction Irisdiction nalysis Yea Ramp at Ka	ſ	vel	V C	altrans D	amp at Katell 12 With Project	
Inputs												
Upstream Ad	Ramp	Terrain Leve	el								Downstrea	nm Adj Ramp
☑ Yes	∭ On										Yes	☑ On
I∕ No	I≅ Off										™ No	⊞ Off
L _{up} =	ft										down =	1015 ft
Vu =	veh/h	`	S _{FF} = 70		show lane	s, L _A , L _D ,V		35.0 m	ph		Vo =	394 veh/h
Convers	ion to pc	/h Under	Base	Condi	tions	·						
(pc/h)	V (Veh/hr)	PHF	Ter	rain	Truck	%Rv		f _{HV}		f _p	v=V/PHF f	HV ^f p
Freeway	6890	0.87	Lev		6	0		971		1.00	8157	
Ramp	547	0.87	Lev	el	6	0	0.	971		1.00	648	
UpStream DownStream	394	0.87	Lev	ام	6	0	٥	971		1.00	466	
Domioacan	007	Merge Areas		ci i	<u> </u>	-	<u> </u>	9/1		rge Areas		
Estimatio	on of v ₁₂			,		Estima	tion	of v		igo Arca.	,	
L _{EQ} = (Equa P _{FM} = 0.296 V ₁₂ = 2415	ation 25-2 or 2 using Equatio	=				L _{EQ} = (Ed P _{FD} = us V ₁₂ = pc/	ing Ed	n 25-8 o		/ _R + (V _F ·	· V _R)P _{FD}	
Capacity	Checks				-	Capaci	ty C	heck	S			
	Actua	l Max	imum	LOS	F?			Actu	al	Max	ximum	LOS F?
						V _{FI} =V _F	<u> </u>			See Ex	hibit 25-14	
V _{FO}	8805	See Exi	nibit 25-7	No)	V ₁₂				44	00:All	
V _{R12}	3063	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	<u> Petermina</u>	ation (i	f not F	5)	Level o	f Se	ervice	De	termir	nation (it	not F)
$D_R = 5$.475 + 0.0073	34 v _R + 0.007	8 V ₁₂ - 0.0	00627 L _A			. [$O_{R} = 4.28$	52 + ().0086 V ₁	₂ - 0.009 L _D	
$D_R = 25.9$		D _R = (pc/ m	/ln)			•					
LOS = C (E		LOS= (Exhib	it 25-4)								
Speed Es		Speed	Esti	matic	on		• .					
	69 (Exibit 25-			D _s =		bit 25-19						
	mph (Exhibi	t 25-19)				S _R = r	nph (Exhibit 2	25-19)	+		
S ₀ = 60.0) mph (Exhibi	t 25-19)				•	-	(Exhibit		•		
S= 59.9	mph (Exhibi	t 25-14)				S = mph (Exhibit 25-15)						·

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WEAVING ANALYSIS

			<u>FREEWA</u>	Y WEAV	/ING WOR	KSHEE	Γ		<u> </u>	
General	informat	ion		Site Information						
Analyst Agency/Com Date Perforn Analysis Tim	ned	07/14/	ngineers 10 eak Hour		Freeway/Dir of Travel Weaving Seg Location Jurisdiction Analysis Year		SR-57 NB Orangewood On to Katella Off Caltrans D12 Year 2013 With Project			
Inputs			······································							
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 1360 Terrain Level				Weaving type Volume ratio Weaving ratio	, VR	B 0.21 0.18				
Convers	ions to p	c/h Unde	r Base C	onditio	าร					
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fHV	fp	٧	
Vo1	3899	0.87	6	0	1.5	1.2	0.971	1.00	4616	
Vo2	12	0.87	6	0	1.5	1.2	0.971	1.00	14	
Vw1	869	0.87	6	0	1.5	1.2	0.971	1.00	1028	
Vw2	189	0.87	6	0	1.5	1.2	0.971	1.00	223	
Vw				1251	Vnw				4630	
V	-								5881	
Weaving	and No	n-Weavin	a Speeds	 }						
`	•		Unconstr			Constrained				
	Weaving (i = w)		(i = w)	Non-Weaving (i = nw)		Weaving (i = w)		Non-Wea	ving (= nw	
a (Exhibit 24		0.08			0.00					
b (Exhibit 24		2.20		6.00						
c (Exhibit 24 d (Exhibit 24		-	0.70		1.00 0.50					
Weaving intensit		0.50 0.47		0.20						
Weaving and nor	n-weaving	52.4		1	0.72					
speeds, Si (mi/h)		for unconstrain			1.29			<u></u>		
	ines required imber of lanes		iou operanoli,	1444	3.50					
		(max) uncons	rained operat	ion		∰ if Nw > Nv	v (max) consti	ained operati	on	
Weaving	y Segmei	nt Speed,	Density,	Level o	f Service,					
	ment speed,			58.76						
	ment density	D (pc/mi/ln)		20.02						
Level of serv	•			C						
	pase condition			11401						
Capacity as a 15-minute flow rate, c (veh/h)			11069							
Capacity as a full-hour volume, c _h (veh/h)			9630			· · · · · · · · · · · · · · · · · · ·				
Notes										
 b. Capacity cons c. Capacity occu 	trained by basic fr rs under constrain	eeway capacity. ed operating condi	ions.	_	eas using the proced Poor operations and	-	-	•		

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.

HCS2000TM

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<u> </u>	1 l£		FREEVVA	T WEAL	/ING WOF					
Genera	l Informat	tion			Site Info	rmation				
Analyst ZS Agency/Company LLG Engineers Date Performed 07/14/10 Analysis Time Period PM Peak Hour					Freeway/Dir of Travel Weaving Seg Location Jurisdiction Analysis Year		SR-57 NB Orangewood On to Katella Of Caltrans D12 Year 2013 With Project			
Inputs					<u> </u>					
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				rel	Weaving type Volume ratio, Weaving ratio	, VR	B 0.12 0.37			
(pc/h)	Tv	PHF	Truck %	RV %	E _T	E _R	fHV	fp	V	
Vo1	7140	0.87	6	0	1.5	1.2	0.971	1.00	8453	
Vo2	15	0.87	6	0	1.5	1.2	0.971	1.00	17	
√w1	602	0.87	6	0	1.5	1.2	0.971	1.00	712	
/w2	359	0.87	6	0	1.5	1.2	0.971	1.00	425	
<u>···-</u> √w				1137	Vnw	1,2	0.071	1.00	8470	
/	<u>"</u>			1101						
Weavin	g and No	n-Weavin	a Speeds						9607	
	g ana ito	I	Unconstr					Constrained		
Weaving (i = w)		Non-Weaving (i = nw)		Weaving (i = w) Non-Weaving			vina (= nw			
a (Exhibit 2		0.08	0.08		0.00				<u> </u>	
Exhibit 2			2.20		6.00					
Exhibit 24		0.70		1.00				ļ		
I (Exhibit 2) Veaving intens			0.50 0.55		0.50 0.20					
Veaving intens Veaving and ne		50.4	*****	† · · · · ·						
peeds, Si (mi/l		1	-	60.69 n, Nw 0.78				<u> </u>		
Maximum n	anes required tumber of lanes If Nw < Nw	, Nw (max)			3.50	∄ if Nw > Nv	v (max) constr	ained operati	on	
		<u> </u>			f Service,			•		
	gment speed, \$			59.26	- · · · · · · · · · · · · · · · · · · ·					
	gment density,	D (pc/mi/ln)		32.42						
evel of ser				D						
	base condition			11691						
	a 15-minute flo	······		11350						
Capacity as	a full-hour volu	ıme, c _h (veh/h)	9875						
. Capacity con: . Capacity occi . Three-lane Ty . Four-lane Typ Capacity cons . Five-lane Typ	strained by basic fre urs under constraine ype A segments do no de A segments do no drained by maximun de A segments do no	eway capacity. d operating condit not operate well at to n allowable weavir ot operate well at to allowable weavir ot operate well at to the second s	ions. volume ratios gre rolume ratios grea ig flow rate: 2,800 rolume ratios great	ater than 0.45. Po ter than 0.35. Po pc/h (Type A), 4, ter than 0.20. Poc	oor operations and so ooo of type B), 3,500 or operations and so or operations and so or operations and so or operations and so	some local queui ome local queuin (Type C). ome local queuing	ng are expected in g g are expected in g	such cases. such cases. such cases.		
Type C weavi	ng segments do not	operate well at vo	lume ratios greate	r than 0.50. Poor	operations and som	e local queuing	are expected in su	ch cases.		

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			FREEWA	Y WEAV	ING WOR	KSHEE	T		<u> </u>		
Genera	l Informat		··-·		Site Information						
Analyst ZS Agency/Company LLG Engineers Date Performed 07/14/10 Analysis Time Period AM Peak Hour					Freeway/Dir of Travel SR Weaving Seg Location Kat Jurisdiction Cat			R-57 SB atella On to Orangewood Off altrans D12 ear 2013 With Project			
Inputs Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 1780			0	Weaving type		A 0.					
Terrain	-g 1011gu1, - (11)		Lev		NASAINA ratio D				19		
Conve	sions to p	c/h Unde	r Base C	ondition	S	7. J. i		<u></u>			
(pc/h)	V	PHF	Truck %	RV %	E _T	E _R	fHV	fp	٧		
Vo1	5820	0.87	6	0	1.5	1.2	0.971	1.00	6890		
Vo2	10	0.87	6	0	1.5	1.2	0.971	1.00	11		
Vw1	736	0.87	6	0	1.5	1.2	0.971	1.00	871		
Vw2	172	0.87	6	0	1.5	1.2	0.971	1.00	203		
Vw				1074	Vnw				6901		
٧	7			L					7975		
Weavin	g and No	n-Weavin	a Speeds	<u> </u>					10.0		
	. V		Unconstr				Cons	trained			
	·····	Weaving	(i = w)	Non-Weaving (i = nw)		Weaving (i = w) Non-V		Non-Wea	ving (= nw)		
a (Exhibit 2		0.15		0.00							
b (Exhibit 2		2.20		4.00							
c (Exhibit 2 d (Exhibit 2		0.97 0.80		1.30					******		
Weaving intens		0.64		0.75 0.31		•					
Weaving and r	оп-weaving	48.63		57.03			<u></u>		<u></u>		
speeds, Si (mii Number of	n) lanes required t			t .	1.24			<u> </u>			
	umber of lanes		ca oporation,	1444	1.40						
	☑ If Nw < Nw	(max) unconst	rained operati	on	1,21	፤ if Nw > Nw	(max) constr	ained operation	on		
Weavin	g Segmer	it Speed,	Density,	Level of	Service,	and Cap	acity				
	gment speed, s			55.73							
	gment density,	D (pc/mi/ln)		28.62							
Level of service, LOS				Đ							
Capacity of base condition, c _b (pc/h)				11040					·		
Capacity as a 15-minute flow rate, c (veh/h)				10718	·						
	a full-hour volu	ıme, c _h (veh/h)	:	9325							
b. Capacity cor c. Capacity occ d. Three-lane T e. Four-lane Ty f. Capacity con	ments longer than 2 istrained by basic fre urs under constraine ype A segments do pe A segments do n strained by maximum pe A segments do no	eway capacity. ed operating conditi not operate well at ot operate well at v n allowable weaving	ons. volume ratios great olume ratios great g flow rate: 2,800	ater than 0.45. Po er than 0.35. Poo pc/h (Type A), 4,	oor operations and so or operations and so 000 (Type B), 3,500	some local queuin ome local queuino (Type C).	ng are expected in g are expected in s	such cases. such cases.			

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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.

			HKEEWA	Y WEAV	ING WOR		1		····		
<u>Genera</u>	l Informat	ion			Site Info	rmation					
Analyst Agency/Col Date Perfor Analysis Tir	med	07/14/	ngineers 10 eak Hour		Freeway/Dir of Weaving Seg Jurisdiction Analysis Year	Location	SR-57 SB Katella On to Orangewood Off Caltrans D12 Year 2013 With Project				
Inputs Freeway fre	ee-flow speed. S	See (mi/h)	65		l	<u> </u>					
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 1780 Terrain Level				Weaving type Volume ratio, Weaving ratio	VR	A 0.15 0.37					
Conver	sions to p	c/h Unde	r Base C	ondition	S						
(pc/h)	V	PHF	Truck %	RV %	E _T	ER	fHV	fp	٧		
Vo1	6923	0.87	6	0	1.5	1.2	0.971	1.00	8196		
Vo2	22	0.87	6	0	1.5	1.2	0.971	1.00	26		
Vw1	753	0.87	6	0	1.5	1.2	0.971	1.00	891		
Vw2	437	0.87	6	0	1.5	1.2	0.971	1.00	517		
Vw				1408	Vnw				8222		
٧					1				9630		
Weavin	g and No	n-Weavin	g Speed:	S					•		
Unconstra					ned			Constrained			
		Weaving		Non-Weaving (i = nw)		Weavi	ng (i = w)	Non-Wea	ving (= nw		
a (Exhibit 2		0.15		0.00			•	<u> </u>			
b (Exhibit 2		2.20		4.00 1.30				-			
c (Exhibit 2 d (Exhibit 2		0.97 0.80		0.75				 			
Weaving intens		0.78			41			<u> </u>			
Weaving and r	non-weaving	45.8		53.99							
	lanes required number of lanes	for unconstrains, Nw (max)	ned operation		1.33 1.40	if Nw > N	w (max) const	rained operati	on		
Weavin	ig Segmer	nt Speed,	Density,	Level of	f Service,	and Ca	oacity				
Weaving se	egment speed,	S (mi/h)	-	52.63							
	egment density,	D (pc/mi/ln)		36.59							
	rvice, LOS	, ,,	·····	E							
	f base condition		m 3	10957							
Capacity as a 15-minute flow rate, c (veh/h) Capacity as a full-hour volume, c _h (veh/h)				10638							
	s a Tun-Nour Vol	ume, c _h (ven/r	1)	9255							
b. Capacity co c. Capacity oc d. Three-lane e. Four-lane T f. Capacity cor g. Five-lane Ty h. Type B wea	gments longer than instrained by basic from the constraint Type A segments do the properties of the constrained by maximuy the A segments do not the constrained by maximuy the A segments do not the constrained by maximuy the A segments do not the constraint tha	eeway capacity. ed operating cond not operate well a not operate well at m allowable weavi tot operate well at ot operate well at	itions. It volume ratios grevolume ratios grev ng flow rate: 2,800 volume ratios great olume ratios great	eater than 0.45. F ater than 0.35. Po pc/h (Type A), 4 ater than 0.20. Po er than 0.80. Poc	or operations and so or operations and so ,000 (Type B), 3,500 or operations and so or operations and so	some local qued ome local quedi O (Type C). ome local quedi me local quedin	uing are expected in ng are expected in ng are expected in g are expected in s	n such cases. such cases. such cases. such cases.			
 Type C wear 	ving segments do no	t operate well at v			r operations and son of Florida, All R		1	UCH CASES.	, , , , , , , , , , , , , , , , , , , ,		

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Conord	Informat		I Charles V V J	* ****	WEAVING WORKSHEET						
Genera	intormat	ion			Site Info	rmation		·			
Analyst ZS Agency/Company LLG Engineers Date Performed 07/14/10 Analysis Time Period AM Peak Hour					Jurisdiction Caltra			7 NB la On to Ball Off ens D12 2013 With Project			
Inputs Freeway fre	e-flow speed, S	SFF (mi/h)	65		Manager 1						
Weaving number of lanes, N 4 Weaving seg length, L (ft) 2130 Terrain Leve					Weaving type Volume ratio, VR Weaving ratio, R			B 0.22 0.18			
Conver	sions to p	c/h Unde	r Base C	ondition	s						
(pc/h)	V	PHF	Truck %	RV %	Ε _T	E _R	fHV	fp	V		
Vo1	3691	0.87	6	0	1.5	1.2	0.971	1.00	4369		
Vo2	10	0.87	6	0	1.5	1.2	0.971	1.00	11		
Vw1	854	0.87	6	0	1.5	1.2	0.971	1.00	1011		
Vw2	188	0.87	6	0	1.5	1.2	0.971	1.00	222		
Vw				1233	Vnw				4380		
√				<u> </u>					5613		
Weaving	g and Nor	ı-Weavin	Speeds	;					****		
···········			Unconstra								
Weaving (i = w)				Non-Weav	Non-Weaving (i = nw) Weaving (i = w)		ıg (i = w)	Non-Wea	ving (= nw		
a (Exhibit 24		0.08		0.00		. "					
b (Exhibit 24 c (Exhibit 24		2.20 0.70		6.0							
d (Exhibit 24		0.70		1.00 0.50							
Weaving intensi		0.43		0.30							
Weaving and no	n-weaving	53.51		60.83							
Maximum ni	anes required fumber of lanes If Nw < Nw	or unconstrain , Nw (max)	ed operation,	Nw	0.87 3.50	if Nw > Nw	(max) constr	I ained operati	on.		
Weaving	g Segmen	t Speed,	Density,	Level of	Service,	and Cap	acity	-			
Weaving se	gment speed, S	S (mi/h)		59.05							
	ment density,	D (pc/mi/ln)		23.76							
Level of ser				C							
	pase condition,			9280							
	a 15-minute flo			9010							
	a full-hour volu	ine, c _h (ven/n)		7839							
 Capacity cons Capacity occurs Three-lane Type Four-lane Type Capacity cons 	nents longer than 2 trained by basic fre rs under constraine pe A segments do no e A segments do no rained by maximum e A segments do no	eway capacity. Id operating condition operate well at operate well at operate well at operate well at vortice well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate well at vortice operate operate well at vortice operate	ons. volume ratios great plume ratios great plow rate: 2,800 p plume ratios great	ater than 0.45. Po er than 0.35. Poo och (Type A), 4, er than 0.20. Poo	oor operations and s or operations and so 000 (Type B), 3,500 or operations and so	some local queuir ome local queuiro (Type C). me local queuiro me local queuiro	ng are expected in s g are expected in s are expected in s	such cases. such cases. such cases.			

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			<u>FREEWA</u>	Y WEAV	ING WOR	KSHEE	Γ		
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	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2013 With Project		
Freeway fre Weaving nu Weaving se Terrain	e-flow speed, s mber of lanes, g length, L (ft)	N	65 4 213 Lev	INVESTING RATIO R			8 0.13 0.35		
(pc/h)	V V	PHF	Truck %	RV %	E _T	ER	fHV	fp	v
Vo1	7350	0.87	6	0	1.5	1.2	0.971	1,00	8701
Vo2	15	0.87	6	0	1.5	1.2	0.971	1.00	17
Vw1	726	0.87	6	0	1.5	1.2	0.971	1.00	859
Vw2	396	0.87	6	0	1.5	1,2	0.971	1.00	468
Vw	1 000		<u> </u>	1327	Vnw	,, <u>r</u>	0.011	1	8718
<u>v</u> V	-				1,			-	10045
·	g and Nor	n-Weavin	a Speeds						10010
TTOUTH	9 4114 1101	1	Unconstr				Cons	strained	
	Weaving (i = w)			ving (i = nw)	Weavir	ng (i = w)	~	ving (= nw)	
	a (Exhibit 24-6) 0.08			0.00		·			
b (Exhibit 2		2.20			00			<u> </u>	
c (Exhibit 2		0.70						 	
d (Exhibit 2 Weaving intens		0.50 0.55		0.50				 	
Weaving and n		†		}				 	
speeds, Si (mi/	1)	50.5		ł .	.75				
Maximum n	anes required tumber of lanes If Nw < Nw	, Nw (max)	•		0.49 3.50	if Nw > Nv ■ if Nw > Nv	v (max) const	rained operati	on
Weavin	g Segmer	nt Speed,	Density,	Level of	Service,	and Cap	acity		
	gment speed,			58.35					
	gment density,	D (pc/mi/ln)		43.04					
Level of ser	······			F·					
	base condition			9400					
	a 15-minute flo			9126					
Capacity as	a full-hour volu	ume, c _h (veh/h)	7940					
b. Capacity cor c. Capacity occ d. Three-lane T e. Four-lane Ty f. Capacity con g. Five-lane Ty h. Type B weak	strained by basic frought of the segments do per A segments do per A segments do restrained by maximur	eway capacity. ed operating condition of operate well at the sallowable weaving of operate well at the op	tions. t volume ratios greated the volume ratios greated from rate: 2,800 volume ratios greated the volume ratios greated	ater than 0.45. Poter than 0.35. Popc/h (Type A), 4, ter than 0.20. Popcr than 0.80. Popcr than 0.80. Popcr than 0.80.	oor operations and so oo0 (Type B), 3,500 or operations and so or operations and so or operations and so	some local queui ome local queuin) (Type C). ome local queuin	ng are expected i g are expected in g are expected in	n such cases. such cases. such cases.	

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<u> </u>	11.6 -		FREEVVA	I WEAV	Y WEAVING WORKSHEET Site Information							
Genera	l Informat	ion			Site Info	rmation						
Analyst Agency/Co Date Perfor Analysis Ti	med	07/14	Engineers /10 eak Hour		Freeway/Dir of Weaving Seg Jurisdiction Analysis Yea	Location	Ball O Caltra	SR-57 SB Ball On to Katella Off Caltrans D12 Year 2013 With Project				
Inputs												
Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 4 Weaving seg length, L (ft) 2490 Terrain Leve Conversions to pc/h Under Base C			el	Weaving type Volume ratio, Weaving ratio	VR	B 0.24 0.37						
(pc/h)	<u>3.0113 to p</u>	PHF	Truck %	RV %	E _T	ER	fHV	fp	V			
Vo1	5313	0.87		 	1.5	1.2	0.971	1.00	6290			
Vo2	30	0.87	6	0	1.5	1.2	0.971	1.00	35			
voz Vw1	1038	0.87	6	0	1.5	1.2	0.971	1.00	1228			
vwi Vw2	609	0.87	 		1.5	1.2	0.971	1.00	721			
	009	0.07	6	0		1.2	0.871	1 1.00	6325			
Vw V			1949	Vnw								
v Weaving and Non-Weaving Speeds									8274			
vveavin	ig and Noi	n-vveavin					Cono	trained				
Unconstra Weaving (i = w)				ving (i = nw)	Meavi	ng (i = w)		ving (= nw)				
a (Exhibit 2	4-6)	0.0			00	110011	19 (1 11/	11011 1100	mg (mm)			
b (Exhibit 2		2.2		6.00					. .			
c (Exhibit 2	4-6)	0.7	0	1.00								
d (Exhibit 2		0.5		0.50								
Weaving inten		0.5	3	0.	29							
Weaving and r speeds, Si (mi		50.8	4	57	.47							
Number of	lanes required to number of lanes	s, Nw (max)			0.90 3.50	√ if Nw > Nι	v (max) constr	ained operati	on			
Weavin	g Segmer	nt Speed.	Density,	Level of	f Service,	and Car	acity					
	egment speed,			55.76								
	egment density,	D (pc/mi/ln)		37.10								
	rvice, LOS	. / n \		E		<u> </u>						
	base condition			9232								
	s a 15-minute fl			8963		·						
	s a full-hour vol	ume, c _h (ven/	1)	7798	******							
b. Capacity conc. Capacity ocond. Three-lane Telescope Type Capacity cond. Five-lane Telescope T	gments longer than a nstrained by basic frours under constrain Type A segments do type A segments do restrained by maximu pe A segments do no ving segments do no	eeway capacity. ed operating cond not operate well a not operate well at m allowable weav ot operate well at	itions. at volume ratios gre volume ratios greating flow rate: 2,800 volume ratios greating greating reatios greating	eater than 0.45. P ater than 0.35. Po) pc/h (Type A), 4 ater than 0.20. Po	or operations and or operations and s ,000 (Type B), 3,500 or operations and so	some local queu ome local queuir) (Type C). ome local queuir	ing are expected in g are expected in g are expected in	n such cases. such cases. such cases.				

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	1 2		17777	WEAVING WORKSHEET Site Information							
General	Informat	ion			Site Info	rmation					
Analyst Agency/Com Date Perforn Analysis Tim	ned	07/14/	ngineers 10 eak Hour		Freeway/Dir of Travel Weaving Seg Location Jurisdiction Analysis Year			SR-57 SB Ball On to Katella Off Caltrans D12 Year 2013 With Project			
Inputs											
Weaving nur	e-flow speed, S nber of lanes, g length, L (ft)		65 4 249 Leve	IWASWING FSTA R			B 0.16 0.42				
Convers	ions to p	c/h Unde	er Base C	ondition	S			_			
(pc/h)	٧	PHF	Truck %	RV %	E _T	E _R	fHV	fp	V		
Vo1	6376	0.87	6	0	1.5	1.2	0.971	1.00	7548		
Vo2	30	0.87	6	0	1.5	1.2	0.971	1.00	35		
Vw1	701	0.87	6	0	1.5	1.2	0.971	1.00	829		
Vw2	511	0.87	6	0	1.5	1.2	0.971	1.00	604		
Vw		•	<u> </u>	1433	Vnw				7583		
Ý	,				'				9016		
Weaving	and No	n-Weavin	g Speeds		····						
***************************************	•		Unconstr				Cons	trained			
	****	Weaving	(i = w)	1	/ing (i = nw)	Weavir	ng (i = w)	Non-Wea	ving (= nw		
a (Exhibit 24		0.08			00						
b (Exhibit 24		2.20		6.00				-			
c (Exhibit 24 d (Exhibit 24		0.70		1.00 0.50					***		
Weaving intensi		0.49	*****		22		•				
Weaving and no	n-weaving	51.8			.12						
speeds, Si (mi/h) anes required :				0.57			<u> </u>			
	umber of lanes		neu operation,	1444	3.50						
	∰ If Nw < Nw		trained operat	ion	ā.	if Nw > Nv	v (max) const	rained operati	ion		
					f Service,	and Cap	acity				
	gment speed,			58.63							
Weaving se	gment density,	, D (pc/mi/ln)		38.44							
Level of ser				E				•			
Capacity of	base condition	ı, c _b (pc/h)		9400				·	***		
· ·	a 15-minute fl			9126							
Capacity as	a full-hour vol	ume, c _h (veh/	1)	7940							
Notes				· ·							
b. Capacity cons c. Capacity occu d. Three-lane Ty e. Four-lane Typ f. Capacity cons g. Five-lane Typ h. Type B weav	strained by basic fr urs under constrain upe A segments do ne A segments do utrained by maximu	eeway capacity. ed operating cond not operate well a not operate well at m allowable weav not operate well at	itions. at volume ratios greavolume ratios grea ng flow rate: 2,800 volume ratios great rotume 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	as using the proced foor operations and s ,000 (Type B), 3,50 or operations and s or operations and so	some local queu ome local queuir 0 (Type C). ome local queuin me local queuing	ing are expected ing are expected in g are expected in g are expected in s	n such cases. such cases. such cases.			

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APPENDIX N-III

YEAR 2013 WITH PROJECT WITH MITIGATION
TRAFFIC CONDITIONS – CALTRANS FREEWAY RAMP
ANALYSIS (HCM METHODOLOGY)

MERGE/DIVERGE ANALYSIS

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WEAVING ANALYSIS

Genera	i Informa				ING WOF			····		
Analyst Agency/Co Date Perfo Analysis Ti	mpany rmed	ZS LLG E 07/14/	ngineers 10 eak Hour		Freeway/Dir Weaving Seç Jurisdiction Analysis Yea	of Travel g Location	Katell Caltra	SR-57 SB Katella On to Orangewood Off Caltrans D12 Year 2013 With Project With N		
Inputs 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				Introduing ratio P			A 0.13 0.19			
Conve	sions to p	oc/h Unde	r Base C	ondition	s					
(pc/h)	V	PHF	Truck %	RV %	E _T	ER	fHV	fp	٧	
/o1	4850	0.87	6	0	1.5	1.2	0.971	1.00	5741	
/o2	8	0.87	6	0	1.5	1.2	0.971	1.00	9	
/w1	613	0.87	6	0	1.5	1.2	0.971	1.00	725	
/w2	143	0.87	6	0	1.5	1.2	0.971	1.00	169	
/w				894	Vnw		******		5750	
/				1				6644		
Neavin	g and No	n-Weavin	g Speeds							
·			Unconstr				Cons	trained		
Weaving (i = w)				Non-Weav	ing (i = nw)	Weavir	g (i = w)		ving (= nw)	
a (Exhibit 2		0.15		0.					<u> </u>	
Exhibit 2		2.20		4.						
: (Exhibit 2 d (Exhibit 2		0.97 0.80		1. 0.					-	
Veaving intens		0.53		0.				1		
Veaving and n	on-weaving	50.89		59.				 		
/aximum r	anes required tumber of lanes	for unconstrain , Nw (max) (max) unconst	ed operation,	Nw	1.21 1.40		(max) constr	I ained operation	on_	
	g Segmer		Density,	Level of	Service,	and Cap	acity			
	gment speed,			57.96						
veaving se evel of sei	gment density,	D (pc/mi/ln)		22.93					···	
	base condition	c (nc/h)		C 14044						
			/L\	11041	·					
	a 15-minute flo a full-hour volu		·/	10719						
	a lui-liour voic	ine, c _h (venn		9326						
. Capacity con . Capacity occ . Three-lane T . Four-lane Ty Capacity con: . Five-lane Ty . Type B weav	ments longer than 2 strained by basic freurs under constraine ype A segments do ne A segments do not atrained by maximum to A segments do not g segments do not g segments do not g segments do not g segments do not strained by not g segments do no	eway capacity. ed operating condition to operate well at word of the condition of the cond	ons. volume ratios great olume ratios great g flow rate: 2,800 p olume ratios greate ume ratios greate	eter than 0.45. Po er than 0.35. Poo pc/n (Type A), 4,0 er than 0.20. Poor r than 0.80. Poor	or operations and s or operations and so 300 (Type B), 3,500 operations and so operations and son	some local queuir ome local queuing (Type C). me local queuing ne local queuing	ng are expected in sare	such cases. such cases. uch cases.		

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gency/Company ate Performed	•••			WEAVING WORKSHEET							
gency/Company ate Performed	70			Site Information							
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 SB Katella On to Orangewood Off Caltrans D12 Year 2013 With Project With M				
nputs			,								
Freeway free-flow speed, SFF (mi/h) 65 Veaving number of lanes, N 5 Veaving seg length, L (ft) 1780 Ferrain Leve		IVVeaving ratio R		VR	A 0.15 0.37						
onversions to p	c/h Unde	r Base C	onditior	าร							
oc/h) V	PHF	Truck %	RV %	E _T	ER	fHV	fp	V			
o1 5769	0.87	6	0	1.5	1.2	0.971	1.00	6829			
o2 18	0.87	6	0	1.5	1.2	0.971	1.00	21			
w1 628	0.87	6	0	1.5	1.2	0.971	1.00	743			
w2 364	0.87	6	0	1.5	1.2	0.971	1.00	430			
w			1173	Vnw				6850			
,								8023			
Veaving and No	n-Weavin	a Speeds	<u> </u>					0020			
Yeaving and No.	T	Unconstr				Cons	trained				
	Weaving		Non-Weaving (i = nw)		Weavi	ng (i = w)		ving (= nw)			
(Exhibit 24-6)	0.15		0.00								
(Exhibit 24-6)	2.20)	4.00								
(Exhibit 24-6)	0,97			30							
(Exhibit 24-6)	0.80).75							
/eaving intensity factor, Wi	0.65).32	32						
/eaving and non-weaving peeds, Si (mi/h)	48.2	6	56	6.55							
lumber of lanes required laximum number of lanes	s, Nw (max)	•		1.30 1.40		()		·			
If Nw < Nw	<u> </u>					w (max) const	aineu operat	ION			
Veaving Segment		Density,	55.16	o Service,	anu Ca	Jacity					
Veaving segment speed, Veaving segment density			29.09								
evel of service, LOS	, <u>o (pominin)</u>		D								
Capacity of base condition	n. c. (pc/h)		10957	-							
Capacity as a 15-minute fi		1/h)	10638								
Capacity as a full-hour vol			9255								
Notes	- No. of Count	·/	1								
NOTES . Weaving segments longer than	2500 ft, are treated	as isolated meme	and diverse an	eas using the proced	ures of Chapter	25, "Ramps and R	amp Junctions".				

- 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.

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_			FREEWA	Y WEAV	ING WOF		Γ				
Genera	Informat	ion	·······		Site Info	rmation					
Analyst Agency/Cor Date Perfon Analysis Tir	med	07/14/	ngineers 10 ak Hour	,	Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	g Location	Katell Caltra	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2013 With Project With M			
Inputs	· · · ·										
Weaving number of lanes, N 5 Weaving seg length, L (ft) 213 Terrain Lev			65 5 213 Leve	IV/eaving ratio R			B 0.22 0.18				
Conver	sions to p	c/h Unde	r Base C	ondition	S						
(pc/h)	V	PHF	Truck %	RV %	E _T	ER	fHV	fp	٧		
Vo1	3691	0.87	6	0	1.5	1.2	0.971	1.00	4369		
Vo2	10	0.87	6	0	1.5	1.2	0.971	1.00	11		
Vw1	854	0.87	6	0	1.5	1.2	0.971	1.00	1011		
Vw2	188	0.87	6	0	1.5	1.2	0.971	1.00	222		
Vw		<u>*</u>		1233	Vnw				4380		
v					_1				5613		
Weavin	g and Nor	n-Weavin	g Speeds	 }							
	V		Unconstra				Cons	trained			
	Weaving (i = w)		(i = w)	Non-Weav	ring (i = nw)	Weavin	g (i = w)		ving (= nw)		
a (Exhibit 24		0.08		0.00							
b (Exhibit 24		2.20			00						
c (Exhibit 24 d (Exhibit 24		0.70 0.50		1.0							
Weaving intensi		0.30		0.9 0.4							
Weaving and no	n-weaving	55.26									
speeds, Si (mi/h		1		62.							
Maximum ni	anes required fumber of lanes	, Nw (max)	-		1.10 3.50	if Nw > Nw	r (max) constr	ained operati	on		
	g Segmen							anted operati	011		
	gment speed, S		,	60.68	3011100,	una oup	doity		*		
···	gment density,			18.50							
Level of ser				В		,					
Capacity of	base condition	, c _b (pc/h)		11601		•					
Capacity as	a 15-minute flo	ow rate, c (veh	/h)	11263							
Capacity as	a full-hour volu	ıme, c _h (veh/h)		9799							
Notes								•			
 Capacity cons Capacity occ. Three-lane Type. Four-lane Type. Capacity cons Five-lane Type. 	ments longer than 2 strained by basic fre urs under constraine rpe A segments do no be A segments do no trained by maximun e A segments do no ng segments do no	eway capacity, ed operating conditi not operate well at ot operate well at v n allowable weavin ot operate well at v	ons. volume ratios great olume ratios great g flow rate: 2,800 p plume ratios great	ater than 0.45. Po er than 0.35. Poo pc/h (Type A), 4,0 er than 0.20. Poo	oor operations and so or operations and so 000 (Type B), 3,500 or operations and so	some local queuir ome local queuir o (Type C). ome local queuiro	ng are expected in are expected in are expected in s	such cases. such cases. such cases.			

General	Informat		REEVYA	VI VVEAV	ING WOF		1			
General	morma	lion			Site into	rmation	<u>.</u>		-	
Analyst Agency/Con Date Perfori Analysis Tin	med	07/14	ingineers /10 eak Hour		Freeway/Dir Weaving Seq Jurisdiction Analysis Yea	g Location	SR-57 NB Katella On to Ball Off Caltrans D12 Year 2013 With Project With M			
Inputs								****		
Weaving nu Weaving se Terrain	Freeway free-flow speed, SFF (mi/h) 65 Weaving number of lanes, N 5 Weaving seg length, L (ft) 213 Ferrain Lev Conversions to pc/h Under Base C			el Weaving ratio, R			B 0.13 0.35			
		7	1		-					
(pc/h)	V	PHF	Truck %	RV %	Ε _T	ER	fHV	fp	V	
Vo1	7350	0.87	6	0	1.5	1.2	0.971	1.00	8701	
Vo2	15	0.87	6	0	1.5	1.2	0.971	1.00	17	
√w1	726	0.87	6	0	1.5	1.2	0.971	1.00	859	
√w2	396	0.87	6	0	1.5	1.2	0.971	1.00	468	
/w				1327	Vnw				8718	
								10045		
Weaving	g and No	n-Weavin	g Speeds							
	-		Unconstr				Cons	trained		
··- ···	Weaving (i = w)		Non-Wea	ving (i = nw)	Weavi	ng (i = w)	Non-Wea	ving (= nw		
a (Exhibit 24		0.08			00					
Exhibit 24			2.20		6.00 1.00					
Exhibit 24 (Exhibit 24)		0.70	0.70		0.50			-		
Veaving intensi		0.47		0.18						
Veaving and no	n-weaving	52.4		†	.48					
peeds, Si (mi/h Number of Is	nes required t	1			0.63			l		
	imber of lanes		· · ·	, 1444	3.50					
f	₹ If Nw < Nw	(max) uncons	trained operat	ion	Į.	if Nw > Nv	v (max) constr	rained operati	ion	
Neaving	g Segmer	nt Speed,	Density,	Level of	Service,					
	gment speed, 3			60.12						
	ment density,	D (pc/mi/ln)		33.42	.,,					
evel of serv		•		D						
Capacity of I	base condition	, c _b (pc/h)		11750						
	a 15-minute flo	:··		11408	<u>.</u> .					
Capacity as	a full-hour volu	.me, c _h (veh/h)	9925						
Capacity cons. Capacity occu. Three-lane Typ. Four-lane Typ Capacity const. Five-lane Type	strained by basic from the under constrained the A segments do the A segments do not trained by maximur to A segments do not	eway capacity. d operating condit not operate well at ot operate well at n allowable weavir of operate well at v	ions. volume ratios gre volume ratios grea g flow rate: 2,800 olume ratios great	ater than 0.45. Poter than 0.35. Po pc/h (Type A), 4, ter than 0.20. Poc	or operations and or operations and so 000 (Type B), 3,500 or operations and so	some local queui ome local queuin J (Type C). ome local queuin	ng are expected in g are expected in g are expected in s	n such cases. such cases. such cases.		
Capacity const . Five-lane Type . Type B weavir	trained by maximur e A segments do n ng segments do no	n allowable weavir of operate well at v t operate well at vo	g flow rate: 2,800 olume ratios great olume ratios greate lume ratios greate	pc/h (Type A), 4, ter than 0.20. Poor er than 0.80. Poor r than 0.50. Poor	000 (Type B), 3,500	O (Type C). Ome local queuing me local queuing ne local queuing	g are expected in s are expected in si	such cases. uch cases.		

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			FREEWA	Y WEAV	ING WOF	RKSHEE	Ţ			
Genera	l Informat	ion			Site Info	rmation				
Analyst Agency/Co Date Perfor Analysis Tir	med	07/14/	ngineers 10 ak Hour		Freeway/Dir Weaving Seg Jurisdiction Analysis Yea	g Location	Ball C Caltra	SR-57 SB Ball On to Katella Off Caltrans D12 Year 2013 With Project With M		
Inputs Freeway fre	ee-flow speed,	SFF (mi/h)	65		T					
Weaving number of lanes, N 5 Weaving seg length, L (ft) 2490 Terrain Leve			MAIOQUING FORO D		, VR		B 0.24 0.37			
Conver	sions to p	c/h Unde	r Base C	ondition	ıs					
(pc/h)	٧	PHF	Truck %	RV %	Ε _T	E _R	fHV	fp	V	
Vo1	5313	0.87	6	0	1.5	1.2	0.971	1.00	6290	
Vo2	30	0.87	6	0	1.5	1,2	0.971	1.00	35	
Vw1	1038	0.87	6	0	1.5	1.2	0.971	1.00	1228	
/w2	609	0.87	6	0	1.5	1.2	0.971	1.00	721	
/w				1949	Vnw				6325	
/			L		J			8274		
Weavin	g and No	n-Weavin	g Speeds						!	
	V	1	Unconstr				Cons	trained		
Weaving (i = w)			Non-Wear	ving (i = nw)	Weavir	ng (i = w)	Non-Wea	ving (= nw)		
		0.08			00					
Exhibit 2		2.20			00	<u> </u>				
c (Exhibit 2 d (Exhibit 2		0.70 0.50			50 50				· · · · · · · · · · · · · · · · · · ·	
Weaving intens		0.30			24			 		
Neaving and n	on-weaving	52.74			.50					
Maximum n	n) anes required t umber of lanes If Nw < Nw	for unconstrain , Nw (max)	ed operation,	Nw	1.12 3.50	if Nw > Nv	v (max) consti	rained operati	on	
Weavin	g Segmer	it Speed,	Density,	Level of	Service,	and Cap	acity			
Neaving se	gment speed, \$	S (mi/h)	···	57.76						
	gment density,	D (pc/mi/ln)		28.65						
evel of ser		. /. 0.		D						
-	base condition	. · ·		11542					 	
	a 15-minute flo			11206						
	a full-hour volu	ıme, c _h (ven/n)	9749						
o. Capacity con c. Capacity occ l. Three-lane T e. Four-lane Ty . Capacity cons g. Five-lane Ty n. Type B weav	ments longer than 2 strained by basic frours under constraine ype A segments do pe A segments do no strained by maximur oe A segments do no ing segments do no ng segments do no	eway capacity. ed operating condity not operate well at word not operate well at word not operate well at word not operate well at word t operate well at vord t operate well at vord t operate well at vord education	ons. volume ratios grevolume ratios greate glow rate: 2,800 olume ratios greatellume ratios greatellume ratios greatellume ratios greatellume ratios greate	ater than 0.45. Poter than 0.35. Poter than 0.35. Poter than 0.20. Poter than 0.80. Poter than 0.80. Poter than 0.80.	oor operations and so or operations and so 000 (Type B), 3,500 or operations and so 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 s are expected in s	n such cases. such cases. such cases. uch cases.		

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Genera	l Informat	tion	FREEWA		Site Information							
Analyst Agency/Co Date Perfor Analysis Ti	mpany med	ZS LLG E 07/14	ingineers /10 eak Hour		Jurisdiction Caltra			7 SB On to Katella Off ans D12 2013 With Project With N				
Weaving no Weaving se Terrain	ee-flow speed, imber of lanes, eg length, L (ft)	, N	65 5 249 Lev	el vveaving ratio, R			B 0.16 0.42					
	sions to p	7			··· ,							
(pc/h)	٧	PHF	Truck %	RV %	E _T	ER	fhv	fp	V			
Vo1	6376	0.87	6	0	1.5	1.2	0.971	1.00	7548			
/o2	30	0.87	6	0	1.5	1.2	0.971	1.00	35			
/w1	701	0.87	6	0	1.5	1.2	0.971	1.00	829			
/w2	511	0.87	6	0	1.5	1.2	0.971	1.00	604			
/w				1433	Vnw				7583			
,				· · · · · · · · · · · · · · · · · · ·	1			9016				
Neavin	g and No	n-Weavin	g Speeds									
			Unconstr				Cons	trained				
	Weaving (i = w)			Non-Wear	ving (i = nw)	Weavir	ıg (i = w)	Non-Wea	ving (= nw)			
a (Exhibit 2		0.08			00							
(Exhibit 2		2.20			00			ļ				
(Exhibit 2	'		0.70		1.00		···					
I (Exhibit 2 Veaving intens		0.50		0.50								
Veaving and n		53.6		0,18 61.80		<u> </u>						
peeds, Si (mi/		<u>. </u>				ļ						
Maximum n	anes required tumber of lanes If Nw < Nw	s, Nw (max)	•		0.72 3.50	if Nw > Nw	r (max) constr	rained operati	on			
V eavin	g Segmer	nt Speed,	Density,	Level of	Service,	and Cap	acity					
Veaving se	gment speed, :	S (mi/h)		60.35								
	gment density,	D (pc/mi/ln)		29.88								
evel of ser				D								
	base condition			11750	<u> </u>			•				
	a 15-minute flo			11408								
Capacity as	a full-hour volu	ume, c _h (veh/h)	9925								
. Capacity con . Capacity occ l. Three-lane T . Four-lane Ty . Capacity cons	ments longer than 2 strained by basic fro urs under constraine ype A segments do pe A segments do n strained by maximur pe A segments do n	eeway capacity. ed operating condit not operate well at tot operate well at allowable weavir	ions. volume ratios great volume ratios great g flow rate: 2,800	ater than 0.45. Poter than 0.35. Poter than 0.35. Poter than 0.35. Poter than 0.35.	oor operations and so or operations and so 000 (Type B), 3,500	some local queuin ome local queuin) (Type C).	ng are expected in	such cases.				

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