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Diverge Analysis

Analyst: JP
Agency/Co.: Florence & Hutcheson
Date performed: 7/8/2011
Analysis time period: AM
Freeway/Dir of Travel: I-385 NB
Junction: Butler Rd off-ramp
Jurisdiction: Greenville, SC
Analysis Year: 2035
Description: I-85/I-385 Alternate 4A

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5999	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	451	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1299	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2960	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5999	451	1299	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1666	125	361	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.917	0.917	0.917	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7265	546	1573	pcph

Estimation of V12 Diverge Areas

$$L = \text{(Equation 13-12 or 13-13)}$$

EQ

$$P = 0.553 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 4263 \quad \text{pc/h}$$

Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		7265	6900	Yes
$v_{FO} = v_F - v_R$		6719	6900	No
v_R		546	2100	No
v_3 or v_{av34}		3002 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or $v_{av34} > 2700$ pc/h?			Yes	
Is v_3 or $v_{av34} > 1.5 v_{12} / 2$			No	
If yes, $v_{12A} = 4565$			(Equation 13-15, 13-16, 13-18, or 13-19)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4565	4400	No

Level of Service Determination (if not F)

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 30.0$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence F			

Speed Estimation

Intermediate speed variable,	$D_S = 0.347$	
Space mean speed in ramp influence area,	$S_R = 53.8$	mph
Space mean speed in outer lanes,	$S_0 = 59.2$	mph
Space mean speed for all vehicles,	$S = 55.7$	mph