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Diverge Analysis

Analyst: JP
Agency/Co.: Florence & Hutcheson
Date performed: 8/9/2011
Analysis time period: AM
Freeway/Dir of Travel: I-85 SB
Junction: Pelham Road
Jurisdiction: Greenville, SC
Analysis Year: 2035
Description: I-85/I-385 Alternate 4A

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	9250	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	2783	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	443	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	9250	2783	443	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	2569	773	123	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	11203	3371	537	pcph

Estimation of V12 Diverge Areas

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

EQ

$$P = 0.436 \quad \text{Using Equation 8}$$

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 6786 \quad \text{pc/h}$$

Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		11203	9200	Yes
$v_{FO} = v_F - v_R$		7832	9200	No
v_R		3371	2100	Yes
v_3 or v_{av34}		2208 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or $v_{av34} > 2700 \text{ pc/h?}$			No	
Is v_3 or $v_{av34} > 1.5 v_{12} / 2$			No	
If yes, $v_{12A} = 6786$			(Equation 13-15, 13-16, 13-18, or 13-19)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	6786	4400	Yes

Level of Service Determination (if not F)

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 50.0$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence F			

Speed Estimation

Intermediate speed variable,	$D_S = 0.601$	
Space mean speed in ramp influence area,	$S_R = 49.2$	mph
Space mean speed in outer lanes,	$S_0 = 61.1$	mph
Space mean speed for all vehicles,	$S = 53.3$	mph