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Diverge Analysis

Analyst: JP
Agency/Co.: Florence & Hutcheson
Date performed: 7/8/2011
Analysis time period: PM
Freeway/Dir of Travel: I-85 SB
Junction: US 276 (EXIT 48A)
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	8897	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	714	vph
Length of first accel/decel lane	420	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	826	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	468	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	8897		714		826	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	2471		198		229	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	10775	865	1000	pcph

Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 5186 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	10775	9200	Yes
$v_{FO} = v_F - v_R$	9910	9200	Yes
v_R	865	1900	No
v_3 or v_{av34}	2794 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, $v_{12A} = 5375$		(Equation 13-15, 13-16, 13-18, or 13-19)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5375	4400	Yes

Level of Service Determination (if not F)

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 46.7$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence F			

Speed Estimation

Intermediate speed variable,	$D_S = 0.636$	
Space mean speed in ramp influence area,	$S_R = 48.6$	mph
Space mean speed in outer lanes,	$S_0 = 59.2$	mph
Space mean speed for all vehicles,	$S = 53.4$	mph