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_____Merge 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
Jurisdiction: Greenville, SC
Analysis Year: 2035
Description: I-85/I-385 Alternate 4A

_____Freeway Data_____

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	8183	vph

_____On Ramp Data_____

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	826	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

_____Adjacent Ramp Data (if one exists)_____

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	714	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	470	ft

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8183	826	714	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	2273	229	198	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	9911	1000	865	pcph

Estimation of V12 Merge Areas

$$L = \text{(Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.093 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 920 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10911	9200	Yes
v_3 or v_{av34}	4495 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or $v_{av34} > 2700$ pc/h?		Yes	
Is v_3 or $v_{av34} > 1.5 v_{12} / 2$		Yes	
If yes, $v_{12A} = 3964$		(Equation 13-15, 13-16, 13-18, or 13-19)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	10911	4600	Yes

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 40.6 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	$M_S = 0.854$	
Space mean speed in ramp influence area,	$S_R = 44.6$	mph
Space mean speed in outer lanes,	$S_0 = 49.4$	mph
Space mean speed for all vehicles,	$S = 47.1$	mph