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-----Merge Analysis-----

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Butler Rd on-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2035  
Description: I-85/I-385 No-Build

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5548	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1299	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	451	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2960	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5548	1299	451	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1541	361	125	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	6719	1573	546	pcph

#### Estimation of V12 Merge Areas

$$L = 2214.29 \text{ (Equation 13-6 or 13-7)}$$

EQ

$$P = 0.608 \text{ Using Equation 1}$$

FM

$$v_{12} = v_F (P_{FM}) = 4087 \text{ pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	8292	6900	Yes
$v_3$ or $v_{av34}$	2632 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, $v_{12A} = 4087$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	8292	4600	Yes

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 42.0 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 1.342$	
Space mean speed in ramp influence area,	$S_R = 35.8$	mph
Space mean speed in outer lanes,	$S_0 = 51.5$	mph
Space mean speed for all vehicles,	$S = 39.7$	mph