

Phone: Fax:
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Merge Analysis

Analyst:
Agency/Co.: Stantec
Date performed: 05/02/17
Analysis time period: 2:00PM-3:00PM
Freeway/Dir of Travel: I-85 Southbound
Junction: Welcome Cntr On-Ramp to I-85 S
Jurisdiction: SCDOT
Analysis Year: 2040 Build Conditions
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	69.4	mph
Volume on freeway	3000	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	158	vph
Length of first accel/decel lane	1076	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	158	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2352	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3000	158	158	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	798	42	42	v
Trucks and buses	30	0	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Rolling	Level	Level	
Grade	%	%	%	%
Length	mi	mi	mi	mi
Trucks and buses PCE, ET	2.5	1.5	1.5	
Recreational vehicle PCE, ER	2.0	1.2	1.2	

Heavy vehicle adjustment, fHV	0.690	1.000	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4628	168	168	pcph

Estimation of V12 Merge Areas

$$L = 932.29 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2812 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4796	7182	No
v_3 or v_{av34}	1816 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or $v_{av34} > 2700$ pc/h?		No	
Is v_3 or $v_{av34} > 1.5 v_{12} / 2$		Yes	
If yes, $v_{12A} = 2812$		(Equation 13-15, 13-16, 13-18, or 13-19)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2980	4600	No

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.9 \quad \text{pc/mi/ln}$$

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

Speed Estimation

Intermediate speed variable,	$M_S = 0.322$	
Space mean speed in ramp influence area,	$S_R = 60.6$	mph
Space mean speed in outer lanes,	$S_0 = 64.7$	mph
Space mean speed for all vehicles,	$S = 62.1$	mph