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_____Merge Analysis_____

Analyst: NJ
Agency/Co.: Florence & Hutcheson
Date performed: 4/20/2011
Analysis time period: PM
Freeway/Dir of Travel: I-385 SB
Junction: Butler Rd on-ramp
Jurisdiction: Greenville, SC
Analysis Year: 2015
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 | 4303 | 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 | 463 | vph |
| Length of first accel/decel lane | 1500 | ft |
| Length of second accel/decel lane | | ft |

_____Adjacent Ramp Data (if one exists)_____

| | | |
|---------------------------|----------|-----|
| Does adjacent ramp exist? | Yes | |
| Volume on adjacent Ramp | 831 | vph |
| Position of adjacent Ramp | Upstream | |
| Type of adjacent Ramp | Off | |
| Distance to adjacent Ramp | 2570 | ft |

_____Conversion to pc/h Under Base Conditions_____

| Junction Components | Freeway | Ramp | Adjacent Ramp | |
|------------------------------|---------|-------|---------------|-----|
| Volume, V (vph) | 4303 | 463 | 831 | vph |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | |
| Peak 15-min volume, v15 | 1195 | 129 | 231 | 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 | 5211 | 561 | 1006 | pcph |

Estimation of V12 Merge Areas

$$L = 1852.61 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.619 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3228 \text{ pc/h}$$

Capacity Checks

| | Actual | Maximum | LOS F? |
|---|-----------|--|--------|
| v_{FO} | 5772 | 6900 | No |
| v_3 or v_{av34} | 1983 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, $v_{12A} = 3228$ | | (Equation 13-15, 13-16, 13-18, or 13-19) | |

Flow Entering Merge Influence Area

| | Actual | Max Desirable | Violation? |
|-----------|--------|---------------|------------|
| v_{R12} | 5772 | 4600 | No |

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.4 \text{ pc/mi/ln}$$

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

Speed Estimation

| | | |
|--|---------------|-----|
| Intermediate speed variable, | $M_S = 0.358$ | |
| Space mean speed in ramp influence area, | $S_R = 53.5$ | mph |
| Space mean speed in outer lanes, | $S_0 = 54.7$ | mph |
| Space mean speed for all vehicles, | $S = 53.9$ | mph |