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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-85 NB  
Junction: US 276  
Jurisdiction: Greenville, SC  
Analysis Year: 2035  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

|                            |       |     |
|----------------------------|-------|-----|
| Type of analysis           | Merge |     |
| Number of lanes in freeway | 4     |     |
| Free-flow speed on freeway | 60.0  | mph |
| Volume on freeway          | 4933  | 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                    | 617   | 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   | 1676     | vph |
| Position of adjacent Ramp | Upstream |     |
| Type of adjacent Ramp     | Off      |     |
| Distance to adjacent Ramp | 500      | ft  |

### \_\_\_\_\_Conversion to pc/h Under Base Conditions\_\_\_\_\_

| Junction Components          | Freeway | Ramp  | Adjacent Ramp |     |
|------------------------------|---------|-------|---------------|-----|
| Volume, V (vph)              | 4933    | 617   | 1676          | vph |
| Peak-hour factor, PHF        | 0.90    | 0.90  | 0.90          |     |
| Peak 15-min volume, v15      | 1370    | 171   | 466           | 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                 | 5974  | 747   | 2030  | pcph |

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.124 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 743 \quad \text{pc/h}$$

#### Capacity Checks

|                                         |           |                                          |        |
|-----------------------------------------|-----------|------------------------------------------|--------|
|                                         | Actual    | Maximum                                  | LOS F? |
| $v_{FO}$                                | 6721      | 9200                                     | No     |
| $v_3$ or $v_{av34}$                     | 2615 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, $v_{12A} = 2389$                |           | (Equation 13-15, 13-16, 13-18, or 13-19) |        |

#### Flow Entering Merge Influence Area

|           |        |               |            |
|-----------|--------|---------------|------------|
|           | Actual | Max Desirable | Violation? |
| $v_{12A}$ | 6721   | 4600          | No         |

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.0 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

|                                          |               |     |
|------------------------------------------|---------------|-----|
| Intermediate speed variable,             | $M_S = 0.390$ |     |
| Space mean speed in ramp influence area, | $S_R = 53.0$  | mph |
| Space mean speed in outer lanes,         | $S_0 = 55.3$  | mph |
| Space mean speed for all vehicles,       | $S = 54.2$    | mph |