

Phone: Fax:  
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### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 11/10/2016  
Analysis time period: 2:00PM-3:00PM  
Freeway/Dir of Travel: I-85 Southbound  
Junction: SC 5 On Ramp to I-85 SB  
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          | 2980  | 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                    | 343   | vph |
| Length of first accel/decel lane  | 675   | ft  |
| Length of second accel/decel lane |       | ft  |

### Adjacent Ramp Data (if one exists)

|                           |          |     |
|---------------------------|----------|-----|
| Does adjacent ramp exist? | Yes      |     |
| Volume on adjacent Ramp   | 178      | vph |
| Position of adjacent Ramp | Upstream |     |
| Type of adjacent Ramp     | Off      |     |
| Distance to adjacent Ramp | 2290     | ft  |

### Conversion to pc/h Under Base Conditions

| Junction Components          | Freeway | Ramp  | Adjacent Ramp |     |
|------------------------------|---------|-------|---------------|-----|
| Volume, V (vph)              | 2980    | 343   | 178           | vph |
| Peak-hour factor, PHF        | 0.94    | 0.94  | 0.94          |     |
| Peak 15-min volume, v15      | 793     | 91    | 47            | v   |
| Trucks and buses             | 30      | 0     | 0             | %   |
| Recreational vehicles        | 0       | 0     | 0             | %   |
| Terrain type:                | Rolling | Level | Level         |     |
| Grade                        | %       | %     | %             |     |
| Length                       | 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                 | 4597  | 365   | 189   | pcph |

#### Estimation of V12 Merge Areas

$$L = 789.77 \quad (\text{Equation 13-6 or 13-7})$$

EQ

$$P = 0.596 \quad \text{Using Equation 1}$$

FM

$$v_{12} = v_F (P_{FM}) = 2742 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

|  | Actual    | Maximum                                  | LOS F? |
|--|-----------|--|--------|
| v <sub>FO</sub>  | 4962      | 7182                                     | No     |
| v <sub>3</sub> or v <sub>av34</sub>                              | 1855 pc/h | (Equation 13-14 or 13-17)                |        |
| Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?              |           | No                                       |        |
| Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2 |           | Yes                                      |        |
| If yes, v <sub>12A</sub> = 2742                                  |           | (Equation 13-15, 13-16, 13-18, or 13-19) |        |

#### Flow Entering Merge Influence Area

|                  | Actual | Max Desirable | Violation? |
|------------------|--------|---------------|------------|
| v <sub>12A</sub> | 3107   | 4600          | No         |

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

$$\text{Density, } D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.3 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

|  |                        |     |
|--|------------------------|-----|
| Intermediate speed variable,             | M <sub>S</sub> = 0.361 |     |
| Space mean speed in ramp influence area, | S <sub>R</sub> = 59.5  | mph |
| Space mean speed in outer lanes,         | S <sub>0</sub> = 64.5  | mph |
| Space mean speed for all vehicles,       | S = 61.3               | mph |