

Phone: Fax:  
E-mail:

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

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Northbound  
Junction: SC 5 On-Ramp to I-85 NB  
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 | 70.7  | mph |
| Volume on freeway          | 1691  | 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                    | 186   | vph |
| Length of first accel/decel lane  | 900   | ft  |
| Length of second accel/decel lane |       | ft  |

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

|                           |          |     |
|---------------------------|----------|-----|
| Does adjacent ramp exist? | Yes      |     |
| Volume on adjacent Ramp   | 343      | vph |
| Position of adjacent Ramp | Upstream |     |
| Type of adjacent Ramp     | Off      |     |
| Distance to adjacent Ramp | 3940     | ft  |

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

| Junction Components          | Freeway | Ramp  | Adjacent Ramp |     |
|------------------------------|---------|-------|---------------|-----|
| Volume, V (vph)              | 1691    | 186   | 343           | vph |
| Peak-hour factor, PHF        | 0.94    | 0.94  | 0.94          |     |
| Peak 15-min volume, v15      | 450     | 49    | 91            | 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                 | 2608  | 198   | 365   | pcph |

#### Estimation of V12 Merge Areas

$$L = 428.28 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1572 \quad \text{pc/h}$$

#### Capacity Checks

|   | Actual    | Maximum                                  | LOS F? |
|---|-----------|--|--------|
| $v_{FO}$                                | 2806      | 7200                                     | No     |
| $v_3$ or $v_{av34}$                     | 1036 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, $v_{12A} = 1572$                |           | (Equation 13-15, 13-16, 13-18, or 13-19) |        |

#### Flow Entering Merge Influence Area

|           | Actual | Max Desirable | Violation? |
|-----------|--------|---------------|------------|
| $v_{12A}$ | 1770   | 4600          | No         |

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.5 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

|  |               |     |
|--|---------------|-----|
| Intermediate speed variable,             | $M_S = 0.281$ |     |
| Space mean speed in ramp influence area, | $S_R = 62.6$  | mph |
| Space mean speed in outer lanes,         | $S_0 = 68.8$  | mph |
| Space mean speed for all vehicles,       | $S = 64.8$    | mph |