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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 9/29/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-85 SB  
Junction: C-D ROAD  
Jurisdiction: Greenville, SC  
Analysis Year: 2010  
Description: I-85/I-385 Existing

### Freeway Data

|                            |         |     |
|----------------------------|---------|-----|
| Type of analysis           | Diverge |     |
| Number of lanes in freeway | 3       |     |
| Free-flow speed on freeway | 60.0    | mph |
| Volume on freeway          | 5609    | vph |

### Off Ramp Data

|                                   |       |     |
|-----------------------------------|-------|-----|
| Side of freeway                   | Right |     |
| Number of lanes in ramp           | 1     |     |
| Free-Flow speed on ramp           | 45.0  | mph |
| Volume on ramp                    | 2119  | vph |
| Length of first accel/decel lane  | 600   | ft  |
| Length of second accel/decel lane |       | ft  |

### Adjacent Ramp Data (if one exists)

|                           |            |     |
|---------------------------|------------|-----|
| Does adjacent ramp exist? | Yes        |     |
| Volume on adjacent ramp   | 1364       | vph |
| Position of adjacent ramp | Downstream |     |
| Type of adjacent ramp     | On         |     |
| Distance to adjacent ramp | 5100       | ft  |

### Conversion to pc/h Under Base Conditions

| Junction Components          | Freeway | Ramp    | Adjacent Ramp |     |
|------------------------------|---------|---------|---------------|-----|
| Volume, V (vph)              | 5609    | 2119    | 1364          | vph |
| Peak-hour factor, PHF        | 0.90    | 0.90    | 0.90          |     |
| Peak 15-min volume, v15      | 1558    | 589     | 379           | v   |
| Trucks and buses             | 18      | 18      | 18            | %   |
| Recreational vehicles        | 0       | 0       | 0             | %   |
| Terrain type:                | Level   | Level   | Level         |     |
| Grade                        | 0.00 %  | 0.00 %  | 0.00 %        |     |
| Length                       | 0.00 mi | 0.00 mi | 0.00 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                 | 6793  | 2566  | 1652  | pcph |

#### Estimation of V12 Diverge Areas

$$L = \text{(Equation 13-12 or 13-13)}$$

EQ

$$P = 0.472 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 4562 \quad \text{pc/h}$$

#### Capacity Checks

|   | Actual    | Maximum                                  | LOS F? |
|---|-----------|--|--------|
| $v_{Fi} = v_F$                          | 6793      | 6900                                     | No     |
| $v_{FO} = v_F - v_R$                    | 4227      | 6900                                     | No     |
| $v_R$                                   | 2566      | 2100                                     | Yes    |
| $v_3$ or $v_{av34}$                     | 2231 pc/h | (Equation 13-14 or 13-17)                |        |
| Is $v_3$ or $v_{av34} > 2700$ pc/h?     |           | No                                       |        |
| Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$ |           | No                                       |        |
| If yes, $v_{12A} = 4562$                |           | (Equation 13-15, 13-16, 13-18, or 13-19) |        |

#### Flow Entering Diverge Influence Area

|          | Actual | Max Desirable | Violation? |
|----------|--------|---------------|------------|
| $v_{12}$ | 4562   | 4400          | Yes        |

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

|   |                                      |          |          |
|---|--------------------------------------|----------|----------|
| Density,  | $D = 4.252 + 0.0086 v_R - 0.009 L_D$ | $= 38.1$ | pc/mi/ln |
| Level of service for ramp-freeway junction areas of influence F |                                      |          |          |

#### Speed Estimation

|  |               |     |
|--|---------------|-----|
| Intermediate speed variable,             | $D_S = 0.529$ |     |
| Space mean speed in ramp influence area, | $S_R = 50.5$  | mph |
| Space mean speed in outer lanes,         | $S_0 = 61.0$  | mph |
| Space mean speed for all vehicles,       | $S = 53.5$    | mph |