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Diverge Analysis

Analyst: JP
Agency/Co.: Florence & Hutcheson
Date performed: 8/24/2011
Analysis time period: PM
Freeway/Dir of Travel: I-85 NB C-D
Junction: I-385 SB from I-85 NB C-D
Jurisdiction: Greenville, SC
Analysis Year: 2035
Description: I-85/I-385 Alternate 4A

Freeway Data

| | | |
|----------------------------|---------|-----|
| Type of analysis | Diverge | |
| Number of lanes in freeway | 2 | |
| Free-flow speed on freeway | 55.0 | mph |
| Volume on freeway | 4308 | 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 | 1572 | 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 | 1665 | vph |
| Position of adjacent ramp | Upstream | |
| Type of adjacent ramp | On | |
| Distance to adjacent ramp | 700 | ft |

Conversion to pc/h Under Base Conditions

| Junction Components | Freeway | Ramp | Adjacent Ramp | |
|------------------------------|---------|---------|---------------|-----|
| Volume, V (vph) | 4308 | 1572 | 1665 | vph |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | |
| Peak 15-min volume, v15 | 1197 | 437 | 463 | v |
| Trucks and buses | 18 | 15 | 15 | % |
| 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 | 0.930 | 0.930 | |
| Driver population factor, fP | 1.00 | 1.00 | 1.00 | |
| Flow rate, vp | 5217 | 1878 | 1989 | pcph |

Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 1.000 \quad \text{Using Equation } 0$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 5217 \quad \text{pc/h}$$

Capacity Checks

| | | | |
|---|--------|--|--------|
| | Actual | Maximum | LOS F? |
| $v_{Fi} = v_F$ | 5217 | 4500 | Yes |
| $v_{FO} = v_F - v_R$ | 3339 | 4500 | No |
| v_R | 1878 | 2100 | No |
| v_3 or v_{av34} | 0 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, $v_{12A} = 5217$ | | (Equation 13-15, 13-16, 13-18, or 13-19) | |

Flow Entering Diverge Influence Area

| | | | |
|----------|--------|---------------|------------|
| | Actual | Max Desirable | Violation? |
| v_{12} | 5217 | 4400 | Yes |

Level of Service Determination (if not F)

| | | | |
|---|--------------------------------------|----------|----------|
| Density, | $D = 4.252 + 0.0086 v_R - 0.009 L_D$ | $= 35.6$ | pc/mi/ln |
| Level of service for ramp-freeway junction areas of influence F | | | |

Speed Estimation

| | | |
|--|--------------------|-----|
| Intermediate speed variable, | $D = 0.467$ | |
| Space mean speed in ramp influence area, | $S_R = 48.9$ | mph |
| Space mean speed in outer lanes, | $S_0 = \text{N/A}$ | mph |
| Space mean speed for all vehicles, | $S = 48.9$ | mph |