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Diverge Analysis

Analyst: JP
Agency/Co.: Florence & Hutcheson
Date performed: 9/23/2011
Analysis time period: AM
Freeway/Dir of Travel: I-85 SB
Junction: US 276 (EXIT48B)
Jurisdiction: Greenville, SC
Analysis Year: 2015
Description: I-85/I-385 Alternate 4A

Freeway Data

| | | |
|----------------------------|---------|-----|
| Type of analysis | Diverge | |
| Number of lanes in freeway | 3 | |
| Free-flow speed on freeway | 60.0 | mph |
| Volume on freeway | 4824 | vph |

Off Ramp Data

| | | |
|-----------------------------------|-------|-----|
| Side of freeway | Right | |
| Number of lanes in ramp | 1 | |
| Free-Flow speed on ramp | 30.0 | mph |
| Volume on ramp | 478 | vph |
| Length of first accel/decel lane | 650 | ft |
| Length of second accel/decel lane | | ft |

Adjacent Ramp Data (if one exists)

| | | |
|---------------------------|------------|-----|
| Does adjacent ramp exist? | Yes | |
| Volume on adjacent ramp | 1135 | vph |
| Position of adjacent ramp | Downstream | |
| Type of adjacent ramp | On | |
| Distance to adjacent ramp | 500 | ft |

Conversion to pc/h Under Base Conditions

| Junction Components | Freeway | Ramp | Adjacent Ramp | |
|------------------------------|---------|---------|---------------|-----|
| Volume, V (vph) | 4824 | 478 | 1135 | vph |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | |
| Peak 15-min volume, v15 | 1340 | 133 | 315 | 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 | 5842 | 579 | 1375 | pcph |

Estimation of V12 Diverge Areas

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

EQ

$$P = 0.587 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 3670 \quad \text{pc/h}$$

Capacity Checks

| | Actual | Maximum | LOS F? |
|---|-----------|--|--------|
| $v_{Fi} = v_F$ | 5842 | 6900 | No |
| $v_{FO} = v_F - v_R$ | 5263 | 6900 | No |
| v_R | 579 | 2000 | No |
| v_3 or v_{av34} | 2172 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, $v_{12A} = 3670$ | | (Equation 13-15, 13-16, 13-18, or 13-19) | |

Flow Entering Diverge Influence Area

| | Actual | Max Desirable | Violation? |
|----------|--------|---------------|------------|
| v_{12} | 3670 | 4400 | No |

Level of Service Determination (if not F)

| | | | |
|---|--------------------------------------|----------|----------|
| Density, | $D = 4.252 + 0.0086 v_R - 0.009 L_D$ | $= 30.0$ | pc/mi/ln |
| Level of service for ramp-freeway junction areas of influence D | | | |

Speed Estimation

| | | |
|--|---------------|-----|
| Intermediate speed variable, | $D_S = 0.545$ | |
| Space mean speed in ramp influence area, | $S_R = 50.2$ | mph |
| Space mean speed in outer lanes, | $S_0 = 61.2$ | mph |
| Space mean speed for all vehicles, | $S = 53.8$ | mph |