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Diverge Analysis

Analyst: JP
Agency/Co.: Florence & Hutcheson
Date performed: 4/5/2011
Analysis time period: PM
Freeway/Dir of Travel: I-385 NB
Junction: Roper Mtn Rd
Jurisdiction: Greenville, SC
Analysis Year: 2035
Description: I-85/I-385 No-Build

Freeway Data

| | | |
|----------------------------|---------|-----|
| Type of analysis | Diverge | |
| Number of lanes in freeway | 4 | |
| Free-flow speed on freeway | 60.0 | mph |
| Volume on freeway | 8318 | vph |

Off Ramp Data

| | | |
|-----------------------------------|-------|-----|
| Side of freeway | Right | |
| Number of lanes in ramp | 2 | |
| Free-Flow speed on ramp | 55.0 | mph |
| Volume on ramp | 1444 | vph |
| Length of first accel/decel lane | 1500 | ft |
| Length of second accel/decel lane | 1500 | ft |

Adjacent Ramp Data (if one exists)

| | | |
|---------------------------|------------|-----|
| Does adjacent ramp exist? | Yes | |
| Volume on adjacent ramp | 1329 | vph |
| Position of adjacent ramp | Downstream | |
| Type of adjacent ramp | On | |
| Distance to adjacent ramp | 1900 | ft |

Conversion to pc/h Under Base Conditions

| Junction Components | Freeway | | Ramp | | Adjacent Ramp | |
|------------------------------|---------|----|-------|----|---------------|-----|
| Volume, V (vph) | 8318 | | 1444 | | 1329 | vph |
| Peak-hour factor, PHF | 0.90 | | 0.90 | | 0.90 | |
| Peak 15-min volume, v15 | 2311 | | 401 | | 369 | 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 | 10074 | 1749 | 1610 | pcph |

Estimation of V12 Diverge Areas

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

EQ

$$P = 0.260 \quad \text{Using Equation 0}$$

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 3913 \quad \text{pc/h}$$

Capacity Checks

| | | | | |
|---|--|-----------|--|--------|
| | | Actual | Maximum | LOS F? |
| $v_{Fi} = v_F$ | | 10074 | 9200 | Yes |
| $v_{FO} = v_F - v_R$ | | 8325 | 9200 | No |
| v_R | | 1749 | 4400 | No |
| v_3 or v_{av34} | | 3080 pc/h | (Equation 13-14 or 13-17) | |
| Is v_3 or $v_{av34} > 2700$ pc/h? | | | Yes | |
| Is v_3 or $v_{av34} > 1.5 v_{12} / 2$ | | | No | |
| If yes, $v_{12A} = 4674$ | | | (Equation 13-15, 13-16, 13-18, or 13-19) | |

Flow Entering Diverge Influence Area

| | | | |
|-----------|--------|---------------|------------|
| | Actual | Max Desirable | Violation? |
| v_{12A} | 4674 | 4400 | No |

Level of Service Determination (if not F)

| | | | |
|---|--------------------------------------|---------|----------|
| Density, | $D = 4.252 + 0.0086 v_R - 0.009 L_D$ | $= 3.9$ | pc/mi/ln |
| Level of service for ramp-freeway junction areas of influence F | | | |

Speed Estimation

| | | |
|--|---------------|-----|
| Intermediate speed variable, | $D_S = 0.325$ | |
| Space mean speed in ramp influence area, | $S_R = 54.1$ | mph |
| Space mean speed in outer lanes, | $S_0 = 59.2$ | mph |
| Space mean speed for all vehicles, | $S = 56.7$ | mph |