

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst:
Agency/Co.: Stantec
Date performed: 11/10/2016
Analysis time period: 2:00PM-3:00PM
Freeway/Dir of Travel: I-85 Southbound
Junction: Shelby Hwy On Ramp to I-85 SB
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 | 3457 | 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 | 250 | vph |
| Length of first accel/decel lane | 365 | ft |
| Length of second accel/decel lane | | ft |

_____Adjacent Ramp Data (if one exists)_____

| | | |
|---------------------------|----------|-----|
| Does adjacent ramp exist? | Yes | |
| Volume on adjacent Ramp | 131 | vph |
| Position of adjacent Ramp | Upstream | |
| Type of adjacent Ramp | Off | |
| Distance to adjacent Ramp | 1322 | ft |

_____Conversion to pc/h Under Base Conditions_____

| Junction Components | Freeway | Ramp | Adjacent Ramp | |
|------------------------------|---------|-------|---------------|-----|
| Volume, V (vph) | 3457 | 250 | 131 | vph |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | |
| Peak 15-min volume, v15 | 919 | 66 | 35 | 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 | 5333 | 266 | 139 | pcph |

Estimation of V12 Merge Areas

$$L = 788.45 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.588 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3134 \quad \text{pc/h}$$

Capacity Checks

| | Actual | Maximum | LOS F? |
|---|-----------|--|--------|
| v_{FO} | 5599 | 7200 | No |
| v_3 or v_{av34} | 2199 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, $v_{12A} = 3134$ | | (Equation 13-15, 13-16, 13-18, or 13-19) | |

Flow Entering Merge Influence Area

| | Actual | Max Desirable | Violation? |
|-----------|--------|---------------|------------|
| v_{12A} | 3400 | 4600 | No |

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.6 \quad \text{pc/mi/ln}$$

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

Speed Estimation

| | | |
|--|---------------|-----|
| Intermediate speed variable, | $M_S = 0.412$ | |
| Space mean speed in ramp influence area, | $S_R = 58.9$ | mph |
| Space mean speed in outer lanes, | $S_0 = 64.6$ | mph |
| Space mean speed for all vehicles, | $S = 61.0$ | mph |