

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Northbound  
Junction: Blacksburg On-Ramp to I-85 NB  
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	69.8	mph
Volume on freeway	1932	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	102	vph
Length of first accel/decel lane	825	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	399	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1440	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1932	102	399	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	514	27	106	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	2980	109	424	pcph

#### Estimation of V12 Merge Areas

$$L = 455.55 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.601 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1790 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3089	7194	No
$v_3$ or $v_{av34}$	1190 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, $v_{12A} = 1790$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	1899	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.289$	
Space mean speed in ramp influence area,	$S_R = 61.8$	mph
Space mean speed in outer lanes,	$S_0 = 67.3$	mph
Space mean speed for all vehicles,	$S = 63.8$	mph

Phone: Fax:  
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-----Merge Analysis-----

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Northbound  
Junction: SC 5 On-Ramp to I-85 NB  
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	1691	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	186	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	343	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3940	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1691	186	343	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	450	49	91	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	2608	198	365	pcph

#### Estimation of V12 Merge Areas

$$L = 428.28 \quad (\text{Equation 13-6 or 13-7})$$

EQ

$$P = 0.603 \quad \text{Using Equation 1}$$

FM

$$v_{12} = v_F (P_{FM}) = 1572 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	2806	7200	No
v <sub>3</sub> or v <sub>av34</sub>	1036 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2		Yes	
If yes, v <sub>12A</sub> = 1572		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	1770	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.5 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.281	
Space mean speed in ramp influence area,	S <sub>R</sub> = 62.6	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 68.8	mph
Space mean speed for all vehicles,	S = 64.8	mph

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\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 8:00AM-9:00AM  
 Freeway/Dir of Travel: I-85 Northbound  
 Junction: Tribal Rd On-Ramp to I-85 NB  
 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	70.3	mph
Volume on freeway	1678	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	141	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	199	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1111	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1678	141	199	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	446	38	53	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	2588	150	212	pcph

#### Estimation of V12 Merge Areas

$$L = 413.73 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1560 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	2738	7200	No
v <sub>3</sub> or v <sub>av34</sub>	1028 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2		Yes	
If yes, v <sub>12A</sub> = 1560		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	1710	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.280	
Space mean speed in ramp influence area,	S <sub>R</sub> = 62.4	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 68.4	mph
Space mean speed for all vehicles,	S = 64.5	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Northbound  
Junction: US 29 On-Ramp to I-85 NB  
Jurisdiction: SCDOT  
Analysis Year: 2040 Build Conditions  
Description:

### Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.7	mph
Volume on freeway	1758	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	113	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	61	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	745	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1758	113	61	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	468	30	16	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	2712	120	65	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2712 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	2832	4800	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, $v_{12A} = 2712$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	2832	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.324$	
Space mean speed in ramp influence area,	$S_R = 61.4$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 61.4$	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
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\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 8:00AM-9:00AM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: US 29 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	70.3	mph
Volume on freeway	1699	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	159	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	72	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2738	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1699	159	72	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	452	42	19	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	2621	169	77	pcph

#### Estimation of V12 Merge Areas

$$L = 424.86 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1580 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	2790	7200	No
v <sub>3</sub> or v <sub>av34</sub>	1041 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2		Yes	
If yes, v <sub>12A</sub> = 1580		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	1749	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.280	
Space mean speed in ramp influence area,	S <sub>R</sub> = 62.4	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 68.4	mph
Space mean speed for all vehicles,	S = 64.5	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
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\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 8:00AM-9:00AM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: Tribal Rd 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	69.0	mph
Volume on freeway	1470	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	254	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	99	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3467	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1470	254	99	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	391	68	26	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	2268	270	105	pcph

#### Estimation of V12 Merge Areas

$$L = 509.96 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1367 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	2538	7170	No
$v_3$ or $v_{av34}$	901 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, $v_{12A} = 1367$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	1637	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.5 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.278$	
Space mean speed in ramp influence area,	$S_R = 61.5$	mph
Space mean speed in outer lanes,	$S_0 = 67.6$	mph
Space mean speed for all vehicles,	$S = 63.5$	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
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\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 8:00AM-9:00AM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: Tribal Rd 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	69.0	mph
Volume on freeway	1470	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	254	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	388	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1615	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1470	254	388	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	391	68	103	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	2268	270	413	pcph

#### Estimation of V12 Merge Areas

$$L = 370.93 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1367 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	2538	7170	No
$v_3$ or $v_{av34}$	901 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, $v_{12A} = 1367$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	1637	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.5 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.278$	
Space mean speed in ramp influence area,	$S_R = 61.5$	mph
Space mean speed in outer lanes,	$S_0 = 67.6$	mph
Space mean speed for all vehicles,	$S = 63.5$	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Southbound  
Junction: Welcome Cntr On-Ramp to I-85 S  
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	69.4	mph
Volume on freeway	1625	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	99	vph
Length of first accel/decel lane	1076	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	96	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2216	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1625	99	96	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	432	26	26	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	2507	105	102	pcph

#### Estimation of V12 Merge Areas

$$L = 453.87 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.608 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1523 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	2612	7182	No
$v_3$ or $v_{av34}$	984 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, $v_{12A} = 1523$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	1628	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.266$	
Space mean speed in ramp influence area,	$S_R = 62.1$	mph
Space mean speed in outer lanes,	$S_0 = 67.7$	mph
Space mean speed for all vehicles,	$S = 64.1$	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Southbound  
Junction: Welcome Cntr On-Ramp to I-85 S  
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	69.4	mph
Volume on freeway	1625	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	99	vph
Length of first accel/decel lane	1076	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	99	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2352	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1625	99	99	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	432	26	26	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	2507	105	105	pcph

#### Estimation of V12 Merge Areas

$$L = 464.91 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.608 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1523 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	2612	7182	No
$v_3$ or $v_{av34}$	984 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, $v_{12A} = 1523$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	1628	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.266$	
Space mean speed in ramp influence area,	$S_R = 62.1$	mph
Space mean speed in outer lanes,	$S_0 = 67.7$	mph
Space mean speed for all vehicles,	$S = 64.1$	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Southbound  
Junction: SC 5 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	69.4	mph
Volume on freeway	1628	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	574	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	96	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2290	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1628	574	96	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	433	153	26	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	2511	611	102	pcph

#### Estimation of V12 Merge Areas

$$L = 495.91 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1513 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3122	7182	No
$v_3$ or $v_{av34}$	998 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, $v_{12A} = 1513$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	2124	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.291$	
Space mean speed in ramp influence area,	$S_R = 61.4$	mph
Space mean speed in outer lanes,	$S_0 = 67.6$	mph
Space mean speed for all vehicles,	$S = 63.3$	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 8:00AM-9:00AM  
Freeway/Dir of Travel: I-85 Southbound  
Junction: Blacksburg 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	69.8	mph
Volume on freeway	2079	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	254	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	123	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2560	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2079	254	123	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	553	68	33	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	3207	270	131	pcph

#### Estimation of V12 Merge Areas

$$L = 571.88 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1933 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	3477	7194	No
v <sub>3</sub> or v <sub>av34</sub>	1274 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2		Yes	
If yes, v <sub>12A</sub> = 1933		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	2203	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.293	
Space mean speed in ramp influence area,	S <sub>R</sub> = 61.6	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 67.0	mph
Space mean speed for all vehicles,	S = 63.5	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 2:00PM-3:00PM  
Freeway/Dir of Travel: I-85 Northbound  
Junction: Blacksburg On-Ramp to I-85 NB  
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	69.8	mph
Volume on freeway	3297	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	97	vph
Length of first accel/decel lane	825	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	287	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1440	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3297	97	287	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	877	26	76	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	5086	103	305	pcph

Estimation of V12 Merge Areas				
L	=	904.95	(Equation 13-6 or 13-7)	
EQ				
P	=	0.601	Using Equation 1	
FM				
v <sub>12</sub>	= v <sub>F</sub> (P <sub>FM</sub> )	=	3055	pc/h

Capacity Checks				
v <sub>FO</sub>		Actual	Maximum	LOS F?
		5189	7194	No
v <sub>3</sub> or v <sub>av34</sub>		2031 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub>	> 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub>	> 1.5 v <sub>12</sub> /2		Yes	
If yes, v <sub>12A</sub>	= 3055	(Equation 13-15, 13-16, 13-18, or 13-19)		

Flow Entering Merge Influence Area			
v <sub>12A</sub>	Actual	Max Desirable	Violation?
	3158	4600	No

Level of Service Determination (if not F)				
Density, D <sub>R</sub>	=	5.475 + 0.00734 v <sub>R</sub> + 0.0078 v <sub>12</sub> - 0.00627 L <sub>A</sub>	=	24.9 pc/mi/ln
Level of service for ramp-freeway junction areas of influence C				

Speed Estimation			
Intermediate speed variable,	M <sub>S</sub>	=	0.355
Space mean speed in ramp influence area,	S <sub>R</sub>	=	59.9 mph
Space mean speed in outer lanes,	S <sub>0</sub>	=	64.3 mph
Space mean speed for all vehicles,	S	=	61.6 mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 2:00PM-3:00PM  
Freeway/Dir of Travel: I-85 Northbound  
Junction: SC 5 On-Ramp to I-85 NB  
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	2939	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	138	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	355	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	3940	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2939	138	355	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	782	37	94	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	4534	147	378	pcph

Estimation of V12 Merge Areas

L

=

(Equation 13-6 or 13-7)

EQ

P

=

0.603

Using Equation

1

FM

v

=

v

(P

)

=

2733

pc/h

12

F

FM

Capacity Checks

		Actual	Maximum	LOS F?
v		4681	7200	No
FO				
v	or v	1801 pc/h	(Equation 13-14 or 13-17)	
3	av34			
Is	v	> 2700 pc/h?	No	
3	av34			
Is	v	> 1.5 v /2	Yes	
3	av34	12		
If yes, v	= 2733	(Equation 13-15, 13-16, 13-18, or 13-19)		
12A				

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	2880	4600	No
12A			

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v

+ 0.0078 v

- 0.00627 L

= 22.2

pc/mi/ln

R

R

12

A

Level of service for ramp-freeway junction areas of influence

C

Speed Estimation

Intermediate speed variable,

M

=

0.327

Space mean speed in ramp influence area,

S

=

61.3

mph

Space mean speed in outer lanes,

S

=

66.0

mph

Space mean speed for all vehicles,

S

=

63.0

mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 2:00PM-3:00PM  
 Freeway/Dir of Travel: I-85 Northbound  
 Junction: Tribal Rd On-Ramp to I-85 NB  
 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	70.3	mph
Volume on freeway	2887	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	190	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	164	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1111	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2887	190	164	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	768	51	44	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	4453	202	174	pcph

#### Estimation of V12 Merge Areas

$$L = 823.97 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2684 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	4655	7200	No
v <sub>3</sub> or v <sub>av34</sub>	1769 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2		Yes	
If yes, v <sub>12A</sub> = 2684		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	2886	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 22.2 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.328	
Space mean speed in ramp influence area,	S <sub>R</sub> = 61.0	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 65.7	mph
Space mean speed for all vehicles,	S = 62.7	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

### \_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 2:00PM-3:00PM  
 Freeway/Dir of Travel: I-85 Northbound  
 Junction: US 29 On-Ramp to I-85 NB  
 Jurisdiction: SCDOT  
 Analysis Year: 2040 Build Conditions  
 Description: \_\_\_\_\_

### \_\_\_\_\_ Freeway Data \_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.7	mph
Volume on freeway	2941	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	113	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

### \_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	110	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	745	ft

### \_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2941	113	110	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	782	30	29	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	4537	120	117	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 4537 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4657	4800	No
v <sub>3</sub> or v <sub>av34</sub>	0	pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?			No	
Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2			No	
If yes, v <sub>12A</sub> = 4537			(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4657	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 36.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.669	
Space mean speed in ramp influence area,	S <sub>R</sub> = 51.5	mph
Space mean speed in outer lanes,	S <sub>0</sub> = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 2:00PM-3:00PM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: US 29 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	70.3	mph
Volume on freeway	2933	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	157	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	181	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2738	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2933	157	181	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	780	42	48	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	4524	167	193	pcph

Estimation of V12 Merge Areas				
L	=	831.67	(Equation 13-6 or 13-7)	
EQ				
P	=	0.603	Using Equation 1	
FM				
v <sub>12</sub>	= v <sub>F</sub> (P <sub>FM</sub> )	=	2727	pc/h

Capacity Checks				
v <sub>FO</sub>		Actual	Maximum	LOS F?
		4691	7200	No
v <sub>3</sub> or v <sub>av34</sub>		1797 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub>	> 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub>	> 1.5 v <sub>12</sub> /2		Yes	
If yes, v <sub>12A</sub>	= 2727	(Equation 13-15, 13-16, 13-18, or 13-19)		

Flow Entering Merge Influence Area			
v <sub>12A</sub>	Actual	Max Desirable	Violation?
	2894	4600	No

Level of Service Determination (if not F)				
Density, D <sub>R</sub>	=	5.475 + 0.00734 v <sub>R</sub> + 0.0078 v <sub>12</sub> - 0.00627 L <sub>A</sub>	=	22.3 pc/mi/ln
Level of service for ramp-freeway junction areas of influence C				

Speed Estimation			
Intermediate speed variable,	M <sub>S</sub>	=	0.328
Space mean speed in ramp influence area,	S <sub>R</sub>	=	61.0 mph
Space mean speed in outer lanes,	S <sub>0</sub>	=	65.6 mph
Space mean speed for all vehicles,	S	=	62.7 mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 2:00PM-3:00PM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: Tribal Rd 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	69.0	mph
Volume on freeway	2961	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	197	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	158	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3467	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2961	197	158	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	788	52	42	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	4567	210	168	pcph

#### Estimation of V12 Merge Areas

$$L = 815.93 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2753 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4777	7170	No
$v_3$ or $v_{av34}$	1814 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, $v_{12A} = 2753$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	2963	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 22.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.333$	
Space mean speed in ramp influence area,	$S_R = 60.0$	mph
Space mean speed in outer lanes,	$S_0 = 64.3$	mph
Space mean speed for all vehicles,	$S = 61.6$	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 2:00PM-3:00PM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: Tribal Rd 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	69.0	mph
Volume on freeway	2961	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	197	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	129	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1615	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2961	197	129	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	788	52	34	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	4567	210	137	pcph

#### Estimation of V12 Merge Areas

$$L = 850.08 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2753 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4777	7170	No
$v_3$ or $v_{av34}$	1814 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, $v_{12A} = 2753$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	2963	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 22.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.333$	
Space mean speed in ramp influence area,	$S_R = 60.0$	mph
Space mean speed in outer lanes,	$S_0 = 64.3$	mph
Space mean speed for all vehicles,	$S = 61.6$	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 2:00PM-3:00PM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: Welcome Cntr On-Ramp to I-85 S  
 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	69.4	mph
Volume on freeway	3000	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	158	vph
Length of first accel/decel lane	1076	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	178	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2216	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3000	158	178	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	798	42	47	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	4628	168	189	pcph

#### Estimation of V12 Merge Areas

$$L = 841.00 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.608 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2812 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	4796	7182	No
v <sub>3</sub> or v <sub>av34</sub>	1816 pc/h	(Equation 13-14 or 13-17)	
Is v <sub>3</sub> or v <sub>av34</sub> > 2700 pc/h?		No	
Is v <sub>3</sub> or v <sub>av34</sub> > 1.5 v <sub>12</sub> / 2		Yes	
If yes, v <sub>12A</sub> = 2812		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	2980	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.322	
Space mean speed in ramp influence area,	S <sub>R</sub> = 60.6	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 64.7	mph
Space mean speed for all vehicles,	S = 62.1	mph

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

\_\_\_\_\_ Merge Analysis \_\_\_\_\_

Analyst: \_\_\_\_\_  
 Agency/Co.: Stantec  
 Date performed: 05/02/17  
 Analysis time period: 2:00PM-3:00PM  
 Freeway/Dir of Travel: I-85 Southbound  
 Junction: Welcome Cntr On-Ramp to I-85 S  
 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	69.4	mph
Volume on freeway	3000	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	158	vph
Length of first accel/decel lane	1076	ft
Length of second accel/decel lane		ft

\_\_\_\_\_ Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	158	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2352	ft

\_\_\_\_\_ Conversion to pc/h Under Base Conditions \_\_\_\_\_

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3000	158	158	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	798	42	42	v
Trucks and buses	30	0	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Rolling	Level	Level	
Grade	%	%	%	%
Length	mi	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	4628	168	168	pcph

#### Estimation of V12 Merge Areas

$$L = 932.29 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.608 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2812 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4796	7182	No
$v_3$ or $v_{av34}$	1816 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, $v_{12A} = 2812$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	2980	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.322$	
Space mean speed in ramp influence area,	$S_R = 60.6$	mph
Space mean speed in outer lanes,	$S_0 = 64.7$	mph
Space mean speed for all vehicles,	$S = 62.1$	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 2:00PM-3:00PM  
Freeway/Dir of Travel: I-85 Southbound  
Junction: SC 5 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	69.4	mph
Volume on freeway	2980	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	343	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	178	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2290	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2980	343	178	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	793	91	47	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	4597	365	189	pcph

#### Estimation of V12 Merge Areas

$$L = 889.67 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2771 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4962	7182	No
$v_3$ or $v_{av34}$	1826 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, $v_{12A} = 2771$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	3136	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.348$	
Space mean speed in ramp influence area,	$S_R = 59.9$	mph
Space mean speed in outer lanes,	$S_0 = 64.6$	mph
Space mean speed for all vehicles,	$S = 61.5$	mph

Phone: Fax:  
E-mail:

### Merge Analysis

Analyst:  
Agency/Co.: Stantec  
Date performed: 05/02/17  
Analysis time period: 2:00PM-3:00PM  
Freeway/Dir of Travel: I-85 Southbound  
Junction: Blacksburg 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	69.8	mph
Volume on freeway	3208	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	380	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	115	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2560	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3208	380	115	vph
Peak-hour factor, PHF	0.94	0.94	0.94	
Peak 15-min volume, v15	853	101	31	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	4949	404	122	pcph

#### Estimation of V12 Merge Areas

$$L = 973.34 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2983 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5353	7194	No
$v_3$ or $v_{av34}$	1966 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, $v_{12A} = 2983$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	3387	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.373$	
Space mean speed in ramp influence area,	$S_R = 59.4$	mph
Space mean speed in outer lanes,	$S_0 = 64.5$	mph
Space mean speed for all vehicles,	$S = 61.2$	mph