

Florence & Hutcheson  
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Columbia, SC 29201

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### Diverge Analysis

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Butler Rd off-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3839	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	322	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	925	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2960	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	3839		322		925	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1066		89		257	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	4649	390	1120	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.626 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3055 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4649	6900	No
$v_{FO} = v_F - v_R$	4259	6900	No
$v_R$	390	2100	No
$v_3$ or $v_{av34}$	1594 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, $v_{12A} = 3055$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3055	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 17.0$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence B			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.333$	
Space mean speed in ramp influence area,	$S_R = 54.0$	mph
Space mean speed in outer lanes,	$S_0 = 63.5$	mph
Space mean speed for all vehicles,	$S = 56.9$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Butler Rd on-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3517	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	925	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	332	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2960	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3517	925	332	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	977	257	92	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4259	1120	402	pcph

#### Estimation of V12 Merge Areas

$$L = 1590.91 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2591 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5379	6900	No
$v_3$ or $v_{av34}$	1668 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2591$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	5379	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.0 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.381$	
Space mean speed in ramp influence area,	$S_R = 53.1$	mph
Space mean speed in outer lanes,	$S_0 = 55.8$	mph
Space mean speed for all vehicles,	$S = 53.9$	mph

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### Diverge Analysis

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Butler Rd off-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2615	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	802	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	244	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2570	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2615		802		244	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	726		223		68	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	3167	971	296	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)

EQ

P = 0.636 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 2368 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3167	6900	No
$v_{FO} = v_F - v_R$	2196	6900	No
$v_R$	971	2100	No
$v_3$ or $v_{av34}$	799 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2368$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2368	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 15.6 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.385$	
Space mean speed in ramp influence area,	$S_R = 53.1$	mph
Space mean speed in outer lanes,	$S_0 = 65.8$	mph
Space mean speed for all vehicles,	$S = 55.8$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Butler Rd on-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1813	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	244	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	802	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2570	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1813	244	802	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	504	68	223	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	2196	296	971	pcph

#### Estimation of V12 Merge Areas

$$L = 1150.69 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.619 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1360 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	2492	6900	No
$v_3 \text{ or } v_{av34}$	836 pc/h	(Equation 13-14 or 13-17)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1360$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	2492	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 8.9 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.206$	
Space mean speed in ramp influence area,	$S_R = 56.3$	mph
Space mean speed in outer lanes,	$S_0 = 58.8$	mph
Space mean speed for all vehicles,	$S = 57.1$	mph



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### Diverge Analysis

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 NB  
Junction: Butler Rd off-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4295	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	262	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	1024	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2960	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	4295		262		1024	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1193		73		284	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	5202	317	1240	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.615 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 3323 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5202	6900	No
$v_{FO} = v_F - v_R$	4885	6900	No
$v_R$	317	2100	No
$v_3$ or $v_{av34}$	1879 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, $v_{12A} = 3323$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3323	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 19.3$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence B			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.327$	
Space mean speed in ramp influence area,	$S_R = 54.1$	mph
Space mean speed in outer lanes,	$S_0 = 62.4$	mph
Space mean speed for all vehicles,	$S = 56.8$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 NB  
Junction: Butler Rd on-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4033	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1024	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	262	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2960	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4033	1024	262	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1120	284	73	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4884	1240	317	pcph

#### Estimation of V12 Merge Areas

$$L = 1750.34 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2971 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	6124	6900	No
$v_3$ or $v_{av34}$	1913 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2971$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	6124	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 30.9 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.485$	
Space mean speed in ramp influence area,	$S_R = 51.3$	mph
Space mean speed in outer lanes,	$S_0 = 54.9$	mph
Space mean speed for all vehicles,	$S = 52.4$	mph

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-----Diverge Analysis-----

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Date performed: 4/20/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: Butler Rd off-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5134	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	831	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	463	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2570	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	5134		831		463	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1426		231		129	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	6218	1006	561	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)

EQ

P = 0.558 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3916$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6218	6900	No
$v_{FO} = v_F - v_R$	5212	6900	No
$v_R$	1006	2100	No
$v_3$ or $v_{av34}$	2302 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, $v_{12A} = 3916$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3916	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 28.9$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.389$	
Space mean speed in ramp influence area,	$S_R = 53.0$	mph
Space mean speed in outer lanes,	$S_0 = 60.7$	mph
Space mean speed for all vehicles,	$S = 55.6$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: NJ  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/20/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: Butler Rd on-ramp  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4303	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	463	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	831	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2570	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4303	463	831	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1195	129	231	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5211	561	1006	pcph

# Estimation of V12 Merge Areas

L = 1852.61 (Equation 13-6 or 13-7)

EQ

P = 0.619 Using Equation 1

FM

v = v (P ) = 3228 pc/h

12 F FM

# Capacity Checks

	Actual	Maximum	LOS F?
v	5772	6900	No
FO			
v or v	1983 pc/h	(Equation 13-14 or 13-17)	
3 av34			
Is v or v	> 2700 pc/h?	No	
3 av34			
Is v or v	> 1.5 v /2	No	
3 av34	12		
If yes, v	= 3228	(Equation 13-15, 13-16, 13-18, or 13-19)	
12A			

# Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	5772	4600	No
R12			

# Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 25.4 pc/mi/ln

R R 12 A C

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

# Speed Estimation

Intermediate speed variable,	M = 0.358	
	S	
Space mean speed in ramp influence area,	S = 53.5	mph
	R	
Space mean speed in outer lanes,	S = 54.7	mph
	0	
Space mean speed for all vehicles,	S = 53.9	mph



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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4442	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	777	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	1219	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2900	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	4442		777		1219	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1234		216		339	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	5380	941	1476	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.582 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3525 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5380	6750	No
$v_{FO} = v_F - v_R$	4439	6750	No
$v_R$	941	2100	No
$v_3$ or $v_{av34}$	1855 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, $v_{12A} = 3525$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3525	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 21.1$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence C			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.383$	
Space mean speed in ramp influence area,	$S_R = 50.0$	mph
Space mean speed in outer lanes,	$S_0 = 57.0$	mph
Space mean speed for all vehicles,	$S = 52.2$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3665	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1219	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1139	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1240	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3665	1219	1139	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1018	339	316	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4439	1476	1379	pcph

#### Estimation of V12 Merge Areas

$$L = 6066.87 \text{ (Equation 13-6 or 13-7)}$$

EQ

$$P = 0.841 \text{ Using Equation 3}$$

FM

$$v_{12} = v_F (P_{FM}) = 3733 \text{ pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	5915	6750	No
v <sub>3</sub> or v <sub>av34</sub>	706 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> = 3733		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5915	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 38.5 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M = 0.935	
Space mean speed in ramp influence area,	S <sub>R</sub> = 42.8	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 54.3	mph
Space mean speed for all vehicles,	S = 43.9	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3665	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1219	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	777	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2860	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3665	1219	777	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1018	339	216	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4439	1476	941	pcph

# Estimation of V12 Merge Areas

L = 1705.61 (Equation 13-6 or 13-7)

EQ

P = 0.608 Using Equation 1

FM

$v_{12} = v_F (P_{FM}) = 2700$  pc/h

12 F FM

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5915	6750	No
$v_3$ or $v_{av34}$	1739 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, $v_{12A} = 2700$		(Equation 13-15, 13-16, 13-18, or 13-19)	

# Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	5915	4600	No

# Level of Service Determination (if not F)

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 30.5$  pc/mi/ln

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

# Speed Estimation

Intermediate speed variable,	M	= 0.476	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 48.8	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 50.5	mph
Space mean speed for all vehicles,	S	= 49.3	mph

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-----Diverge Analysis-----

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3729	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	1327	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	213	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3400	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	3729		1327		213	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1036		369		59	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	4516	1607	258	pcph

# Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)

EQ

P = 0.573 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 3274 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4516	6750	No
$v_{FO} = v_F - v_R$	2909	6750	No
$v_R$	1607	2100	No
$v_3 \text{ or } v_{av34}$	1242 pc/h	(Equation 13-14 or 13-17)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 3274$		(Equation 13-15, 13-16, 13-18, or 13-19)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3274	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 23.4 \text{ pc/mi/ln}$

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.443$	
Space mean speed in ramp influence area,	$S_R = 49.2$	mph
Space mean speed in outer lanes,	$S_0 = 59.4$	mph
Space mean speed for all vehicles,	$S = 51.7$	mph



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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3729	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	1327	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	535	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	910	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	3729		1327		535	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1036		369		149	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	4516	1607	648	pcph

#### Estimation of V12 Diverge Areas

$$L = 12287.62 \text{ Equation 13-12 or 13-13}$$

EQ

$$P = 0.971 \text{ Using Equation 6}$$

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 4432 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4516	6750	No
$v_{FO} = v_F - v_R$	2909	6750	No
$v_R$	1607	2100	No
$v_3$ or $v_{av34}$	84 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 4432$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4432	4400	Yes

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 33.4$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.443$	
Space mean speed in ramp influence area,	$S_R = 49.2$	mph
Space mean speed in outer lanes,	$S_0 = 60.3$	mph
Space mean speed for all vehicles,	$S = 49.4$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2402	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	213	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	1327	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3000	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2402	213	1327	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	667	59	369	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	2909	258	1607	pcph

#### Estimation of V12 Merge Areas

$$L = 1295.14 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.619 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1802 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3167	6750	No
$v_3$ or $v_{av34}$	1107 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1802$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	3167	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.0 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.217$	
Space mean speed in ramp influence area,	$S_R = 52.2$	mph
Space mean speed in outer lanes,	$S_0 = 52.8$	mph
Space mean speed for all vehicles,	$S = 52.4$	mph

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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: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5057	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	789	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	1131	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2900	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5057	789	1131	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1405	219	314	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	6125	956	1370	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.563 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3866 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		6125	6750	No
$v_{FO} = v_F - v_R$		5169	6750	No
$v_R$		956	2100	No
$v_3$ or $v_{av34}$		2259 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, $v_{12A} = 3866$			(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3866	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 24.0$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence C			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.384$	
Space mean speed in ramp influence area,	$S_R = 50.0$	mph
Space mean speed in outer lanes,	$S_0 = 55.4$	mph
Space mean speed for all vehicles,	$S = 51.9$	mph

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

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 NB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4268	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1131	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1214	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1240	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4268	1131	1214	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1186	314	337	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5169	1370	1470	pcph

#### Estimation of V12 Merge Areas

$$L = 6467.22 \text{ (Equation 13-6 or 13-7)}$$

EQ

$$P = 0.860 \text{ Using Equation 3}$$

FM

$$v_{12} = v_F (P_{FM}) = 4447 \text{ pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	6539	6750	No
v <sub>3</sub> or v <sub>av34</sub>	722 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> = 4447		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6539	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 43.3 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M = 1.532	
Space mean speed in ramp influence area,	S <sub>R</sub> = 35.1	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 54.2	mph
Space mean speed for all vehicles,	S = 36.5	mph



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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 NB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4268	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1131	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	789	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2860	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4268	1131	789	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1186	314	219	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5169	1370	956	pcph

#### Estimation of V12 Merge Areas

$$L = 1839.15 \text{ (Equation 13-6 or 13-7)}$$

EQ

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

FM

$$v_{12} = v_F (P_{FM}) = 3144 \text{ pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	6539	6750	No
v <sub>3</sub> or v <sub>av34</sub>	2025 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> = 3144		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6539	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 33.2 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.578	
Space mean speed in ramp influence area,	S <sub>R</sub> = 47.5	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 49.5	mph
Space mean speed for all vehicles,	S = 48.1	mph

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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 SB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5632	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	1119	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	621	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3400	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5632	1119	621	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1564	311	173	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	6821	1355	752	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.527 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 4236 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		6821	6750	Yes
$v_{FO} = v_F - v_R$		5466	6750	No
$v_R$		1355	2100	No
$v_3$ or $v_{av34}$		2585 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, $v_{12A} = 4236$			(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4236	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 31.7$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence F			

#### Speed Estimation

Intermediate speed variable,	$D = 0.420$	
Space mean speed in ramp influence area,	$S_R = 49.5$	mph
Space mean speed in outer lanes,	$S_0 = 54.2$	mph
Space mean speed for all vehicles,	$S = 51.2$	mph

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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 SB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5632	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	1119	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1018	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	910	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5632	1119	1018	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1564	311	283	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	6821	1355	1233	pcph

#### Estimation of V12 Diverge Areas

$$L = 9871.66 \text{ (Equation 13-12 or 13-13)}$$

EQ

$$P = 1.000 \text{ Using Equation 6}$$

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 6821 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6821	6750	Yes
$v_{FO} = v_F - v_R$	5466	6750	No
$v_R$	1355	2100	No
$v_3$ or $v_{av34}$	0 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 6821$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	6821	4400	Yes

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 53.9$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence F			

#### Speed Estimation

Intermediate speed variable,	$D = 0.420$	
Space mean speed in ramp influence area,	$S_R = 49.5$	mph
Space mean speed in outer lanes,	$S_0 = 60.3$	mph
Space mean speed for all vehicles,	$S = 49.5$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: Woodruff  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4513	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	621	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	1119	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3000	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4513	621	1119	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1254	173	311	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5466	752	1355	pcph

# Estimation of V12 Merge Areas

L = 1948.05 (Equation 13-6 or 13-7)

EQ

P = 0.619 Using Equation 1

FM

v = v (P ) = 3386 pc/h

12 F FM

# Capacity Checks

	Actual	Maximum	LOS F?
v	6218	6750	No
FO			
v or v	2080 pc/h	(Equation 13-14 or 13-17)	
3 av34			
Is v or v	> 2700 pc/h?	No	
3 av34			
Is v or v	> 1.5 v /2	No	
3 av34	12		
If yes, v	= 3386	(Equation 13-15, 13-16, 13-18, or 13-19)	
12A			

# Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	6218	4600	No
R12			

# Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 28.0+ pc/mi/ln

R R 12 A

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

# Speed Estimation

Intermediate speed variable,	M = 0.430	
	S	
Space mean speed in ramp influence area,	S = 49.4	mph
	R	
Space mean speed in outer lanes,	S = 49.3	mph
	0	
Space mean speed for all vehicles,	S = 49.4	mph



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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4884	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	1139	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	919	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1800	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	4884		1139		919	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1357		316		255	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	5915	1379	1113	pcph

#### Estimation of V12 Diverge Areas

$$L = 2466.66 \text{ (Equation 13-12 or 13-13)}$$

EQ

$$P = 0.568 \text{ Using Equation 7}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3958 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5915	6750	No
$v_{FO} = v_F - v_R$	4536	6750	No
$v_R$	1379	2100	No
$v_3$ or $v_{av34}$	1957 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 3958$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3958	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 29.3$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D = 0.422$	
Space mean speed in ramp influence area,	$S_R = 49.5$	mph
Space mean speed in outer lanes,	$S_0 = 56.6$	mph
Space mean speed for all vehicles,	$S = 51.7$	mph

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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4884	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	1139	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1219	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1100	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4884	1139	1219	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1357	316	339	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	5915	1379	1476	pcph

#### Estimation of V12 Diverge Areas

L = 14436.48 Equation 13-12 or 13-13)

EQ

P = 1.000 Using Equation 6

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 5915 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5915	6750	No
$v_{FO} = v_F - v_R$	4536	6750	No
$v_R$	1379	2100	No
$v_3 \text{ or } v_{av34}$	0 pc/h	(Equation 13-14 or 13-17)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 5915$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	5915	4400	Yes

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 46.1 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.422$	
Space mean speed in ramp influence area,	$S_R = 49.5$	mph
Space mean speed in outer lanes,	$S_0 = 60.3$	mph
Space mean speed for all vehicles,	$S = 49.5$	mph

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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3745	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	919	vph
Length of first accel/decel lane	940	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1938	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1500	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3745	919	1938	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1040	255	538	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	4536	1113	2347	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.595 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3151 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4536	6750	No
$v_{FO} = v_F - v_R$	3423	6750	No
$v_R$	1113	1900	No
$v_3$ or $v_{av34}$	1385 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, $v_{12A} = 3151$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3151	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 22.9$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence C			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.658$	
Space mean speed in ramp influence area,	$S_R = 46.4$	mph
Space mean speed in outer lanes,	$S_0 = 58.8$	mph
Space mean speed for all vehicles,	$S = 49.6$	mph

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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3745	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	919	vph
Length of first accel/decel lane	940	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1139	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1800	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3745	919	1139	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1040	255	316	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	4536	1113	1379	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.595 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3151 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4536	6750	No
$v_{FO} = v_F - v_R$	3423	6750	No
$v_R$	1113	1900	No
$v_3$ or $v_{av34}$	1385 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, $v_{12A} = 3151$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3151	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 22.9$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence C			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.658$	
Space mean speed in ramp influence area,	$S_R = 46.4$	mph
Space mean speed in outer lanes,	$S_0 = 58.8$	mph
Space mean speed for all vehicles,	$S = 49.6$	mph



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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2826	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1938	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	1593	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3100	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2826	1938	1593	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	785	538	443	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	3423	2347	1929	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.555 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1900 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5770	6750	No
$v_3$ or $v_{av34}$	1523 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, $v_{12A} = 1956$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	5770	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 9.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.204$	
Space mean speed in ramp influence area,	$S_R = 52.3$	mph
Space mean speed in outer lanes,	$S_0 = 51.5$	mph
Space mean speed for all vehicles,	$S = 52.1$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2826	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1938	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	919	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1600	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2826	1938	919	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	785	538	255	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	3423	2347	1113	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.555 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1900 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	5770	6750	No
v <sub>3</sub> or v <sub>av34</sub>	1523 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> = 1956		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	5770	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 9.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.204	
Space mean speed in ramp influence area,	S <sub>R</sub> = 52.3	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 51.5	mph
Space mean speed for all vehicles,	S = 52.1	mph

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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3548	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1652	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	1299	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	3548		1652		1299	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	986		459		361	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	4297	2001	1573	pcph

#### Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 2598 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4297	9000	No
$v_{FO} = v_F - v_R$	2296	9000	No
$v_R$	2001	4200	No
$v_3$ or $v_{av34}$	849 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, $v_{12A} = 2598$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2598	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= -13.9$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence A			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.478$	
Space mean speed in ramp influence area,	$S_R = 48.8$	mph
Space mean speed in outer lanes,	$S_0 = 60.3$	mph
Space mean speed for all vehicles,	$S = 52.8$	mph

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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3548	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1652	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	844	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1600	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	3548		1652		844	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	986		459		234	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	4297	2001	1022	pcph

#### Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 2598 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4297	9000	No
$v_{FO} = v_F - v_R$	2296	9000	No
$v_R$	2001	4200	No
$v_3$ or $v_{av34}$	849 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, $v_{12A} = 2598$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2598	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= -13.9$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence A			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.478$	
Space mean speed in ramp influence area,	$S_R = 48.8$	mph
Space mean speed in outer lanes,	$S_0 = 60.3$	mph
Space mean speed for all vehicles,	$S = 52.8$	mph



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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1896	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1299	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	535	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1896	1299	535	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	527	361	149	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	2296	1573	648	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1397 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3869	6750	No
$v_3$ or $v_{av34}$	899 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, $v_{12A} = 1397$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	3869	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.0 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.331$	
Space mean speed in ramp influence area,	$S_R = 50.7$	mph
Space mean speed in outer lanes,	$S_0 = 53.6$	mph
Space mean speed for all vehicles,	$S = 51.3$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1896	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1299	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1652	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1896	1299	1652	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	527	361	459	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	2296	1573	2001	pcph

#### Estimation of V12 Merge Areas

$$L = 482.97 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1397 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3869	6750	No
$v_3$ or $v_{av34}$	899 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, $v_{12A} = 1397$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	3869	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.0 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.331$	
Space mean speed in ramp influence area,	$S_R = 50.7$	mph
Space mean speed in outer lanes,	$S_0 = 53.6$	mph
Space mean speed for all vehicles,	$S = 51.3$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3194	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	535	vph
Length of first accel/decel lane	920	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1327	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	920	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3194	535	1327	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	887	149	369	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	3868	648	1607	pcph

#### Estimation of V12 Merge Areas

$$L = 7724.48 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 1.000 \text{ Using Equation 3}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3868 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4516	6750	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, $v_{12A} = 3868$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	4516	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 34.6 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.623$	
Space mean speed in ramp influence area,	$S_R = 46.9$	mph
Space mean speed in outer lanes,	$S_0 = 55.0$	mph
Space mean speed for all vehicles,	$S = 46.9$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3194	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	535	vph
Length of first accel/decel lane	920	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1299	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2900	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3194	535	1299	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	887	149	361	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	3868	648	1573	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2333 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4516	6750	No
$v_3$ or $v_{av34}$	1535 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, $v_{12A} = 2333$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	4516	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 22.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.343$	
Space mean speed in ramp influence area,	$S_R = 50.5$	mph
Space mean speed in outer lanes,	$S_0 = 51.3$	mph
Space mean speed for all vehicles,	$S = 50.8$	mph



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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: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5399	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	1214	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	830	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1800	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5399	1214	830	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1500	337	231	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	6539	1470	1005	pcph

#### Estimation of V12 Diverge Areas

$$L = 2527.65 \text{ (Equation 13-12 or 13-13)}$$

EQ

$$P = 0.548 \text{ Using Equation 7}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 4247 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6539	6750	No
$v_{FO} = v_F - v_R$	5069	6750	No
$v_R$	1470	2100	No
$v_3 \text{ or } v_{av34}$	2292 pc/h	(Equation 13-14 or 13-17)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 4247$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4247	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 31.8$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D = 0.430$	
Space mean speed in ramp influence area,	$S_R = 49.4$	mph
Space mean speed in outer lanes,	$S_0 = 55.3$	mph
Space mean speed for all vehicles,	$S = 51.3$	mph

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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: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5399	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	1214	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1131	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1100	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5399	1214	1131	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1500	337	314	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	6539	1470	1370	pcph

#### Estimation of V12 Diverge Areas

$$L = 12491.22 \text{ Equation 13-12 or 13-13}$$

EQ

$$P = 1.000 \text{ Using Equation 6}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 6539 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6539	6750	No
$v_{FO} = v_F - v_R$	5069	6750	No
$v_R$	1470	2100	No
$v_3 \text{ or } v_{av34}$	0 pc/h	(Equation 13-14 or 13-17)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 6539$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	6539	4400	Yes

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 51.5$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence E			

#### Speed Estimation

Intermediate speed variable,	$D = 0.430$	
Space mean speed in ramp influence area,	$S_R = 49.4$	mph
Space mean speed in outer lanes,	$S_0 = 60.3$	mph
Space mean speed for all vehicles,	$S = 49.4$	mph

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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: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4185	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	830	vph
Length of first accel/decel lane	940	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1895	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1500	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4185	830	1895	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1163	231	526	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	5069	1005	2295	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)

EQ

P = 0.587 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3391$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5069	6750	No
$v_{FO} = v_F - v_R$	4064	6750	No
$v_R$	1005	1900	No
$v_3$ or $v_{av34}$	1678 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, $v_{12A} = 3391$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3391	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 25.0$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.648$	
Space mean speed in ramp influence area,	$S_R = 46.6$	mph
Space mean speed in outer lanes,	$S_0 = 57.7$	mph
Space mean speed for all vehicles,	$S = 49.7$	mph

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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: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4185	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	830	vph
Length of first accel/decel lane	940	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1214	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1800	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	4185		830		1214	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1163		231		337	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	5069	1005	1470	pcph

#### Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 3391 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5069	6750	No
$v_{FO} = v_F - v_R$	4064	6750	No
$v_R$	1005	1900	No
$v_3$ or $v_{av34}$	1678 pc/h	(Equation 13-14 or 13-17)	
Is $v_3$ or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 3391$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3391	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 25.0$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence C			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.648$	
Space mean speed in ramp influence area,	$S_R = 46.6$	mph
Space mean speed in outer lanes,	$S_0 = 57.7$	mph
Space mean speed for all vehicles,	$S = 49.7$	mph



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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3355	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1895	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	896	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3100	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3355	1895	896	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	932	526	249	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4063	2295	1085	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.555 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2255 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	6358	6750	No
v <sub>3</sub> or v <sub>av34</sub>	1808 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> = 2321		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	6358	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.2 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub> = 0.310	
Space mean speed in ramp influence area,	S <sub>R</sub> = 51.0	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 50.5	mph
Space mean speed for all vehicles,	S = 50.8	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 NB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3355	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1895	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	830	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1600	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3355	1895	830	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	932	526	231	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4063	2295	1005	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.555 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2255 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	6358	6750	No
$v_3$ or $v_{av34}$	1808 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, $v_{12A} = 2321$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	6358	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.2 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.310$	
Space mean speed in ramp influence area,	$S_R = 51.0$	mph
Space mean speed in outer lanes,	$S_0 = 50.5$	mph
Space mean speed for all vehicles,	$S = 50.8$	mph

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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 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	6594	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	2730	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	750	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6594	2730	750	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1832	758	208	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	7986	3306	908	pcph

#### Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 4523 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7986	9000	No
$v_{FO} = v_F - v_R$	4680	9000	No
$v_R$	3306	4200	No
$v_3$ or $v_{av34}$	1731 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, $v_{12A} = 4523$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4523	4400	Yes

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 2.6$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence A			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.596$	
Space mean speed in ramp influence area,	$S_R = 47.3$	mph
Space mean speed in outer lanes,	$S_0 = 57.5$	mph
Space mean speed for all vehicles,	$S = 51.2$	mph

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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 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	6594	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	2730	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	1796	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1600	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6594	2730	1796	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1832	758	499	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	7986	3306	2175	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)

EQ

P = 0.260 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 4523$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7986	9000	No
$v_{FO} = v_F - v_R$	4680	9000	No
$v_R$	3306	4200	No
$v_3$ or $v_{av34}$	1731 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, $v_{12A} = 4523$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4523	4400	Yes

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 2.6$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence A			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.596$	
Space mean speed in ramp influence area,	$S_R = 47.3$	mph
Space mean speed in outer lanes,	$S_0 = 57.5$	mph
Space mean speed for all vehicles,	$S = 51.2$	mph



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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3864	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	750	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1018	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3864	750	1018	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1073	208	283	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4680	908	1233	pcph

-----Estimation of V12 Merge Areas-----

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2847 \quad \text{pc/h}$$

-----Capacity Checks-----

	Actual	Maximum	LOS F?
v <sub>FO</sub>	5588	6750	No
v <sub>3</sub> or v <sub>av34</sub>	1833 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> = 2847		(Equation 13-15, 13-16, 13-18, or 13-19)	

-----Flow Entering Merge Influence Area-----

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5588	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.4 \quad \text{pc/mi/ln}$$

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

-----Speed Estimation-----

Intermediate speed variable,	M <sub>S</sub> = 0.422	
Space mean speed in ramp influence area,	S <sub>R</sub> = 49.5	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 50.2	mph
Space mean speed for all vehicles,	S = 49.7	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3864	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	750	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	2730	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3864	750	2730	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1073	208	758	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	4680	908	3306	pcph

#### Estimation of V12 Merge Areas

$$L = 850.83 \quad (\text{Equation 13-6 or 13-7})$$

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2847 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5588	6750	No
$v_3$ or $v_{av34}$	1833 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, $v_{12A} = 2847$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	5588	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.422$	
Space mean speed in ramp influence area,	$S_R = 49.5$	mph
Space mean speed in outer lanes,	$S_0 = 50.2$	mph
Space mean speed for all vehicles,	$S = 49.7$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4614	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1018	vph
Length of first accel/decel lane	920	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1119	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	920	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4614	1018	1119	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1282	283	311	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5588	1233	1355	pcph

#### Estimation of V12 Merge Areas

$$L = 6513.17 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.936 \text{ Using Equation 3}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 5229 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	6821	6750	Yes
$v_3$ or $v_{av34}$	359 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, $v_{12A} = 5229$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	6821	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 49.5 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 2.763$	
Space mean speed in ramp influence area,	$S_R = 19.1$	mph
Space mean speed in outer lanes,	$S_0 = 55.0$	mph
Space mean speed for all vehicles,	$S = 19.8$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: I-85  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4614	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1018	vph
Length of first accel/decel lane	920	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	750	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2900	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4614	1018	750	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1282	283	208	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5588	1233	908	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3371 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	6821	6750	Yes
$v_3$ or $v_{av34}$	2217 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, $v_{12A} = 3371$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	6821	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 35.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.655$	
Space mean speed in ramp influence area,	$S_R = 46.5$	mph
Space mean speed in outer lanes,	$S_0 = 48.8$	mph
Space mean speed for all vehicles,	$S = 47.2$	mph



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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4764	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1593	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	451	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)	4764		1593		451	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1323		443		125	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	5770	1929	546	pcph

#### Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 2928 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5770	9000	No
$v_{FO} = v_F - v_R$	3841	9000	No
$v_R$	1929	4200	No
$v_3$ or $v_{av34}$	1421 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, $v_{12A} = 2928$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2928	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= -11.1$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence A			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.472$	
Space mean speed in ramp influence area,	$S_R = 48.9$	mph
Space mean speed in outer lanes,	$S_0 = 58.7$	mph
Space mean speed for all vehicles,	$S = 53.3$	mph

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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4764	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1593	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	1938	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3100	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4764	1593	1938	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1323	443	538	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	5770	1929	2347	pcph

#### Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 2928 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5770	9000	No
$v_{FO} = v_F - v_R$	3841	9000	No
$v_R$	1929	4200	No
$v_3$ or $v_{av34}$	1421 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, $v_{12A} = 2928$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2928	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= -11.1$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence A			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.472$	
Space mean speed in ramp influence area,	$S_R = 48.9$	mph
Space mean speed in outer lanes,	$S_0 = 58.7$	mph
Space mean speed for all vehicles,	$S = 53.3$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 NB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3171	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	451	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	1593	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1950	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3171	451	1593	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	881	125	443	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	3840	546	1929	pcph

-----Estimation of V12 Merge Areas-----

$$L = 1556.00 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.619 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2379 \text{ pc/h}$$

-----Capacity Checks-----

	Actual	Maximum	LOS F?
v <sub>FO</sub>	4386	6750	No
v <sub>3</sub> or v <sub>av34</sub>	1461 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> = 2379		(Equation 13-15, 13-16, 13-18, or 13-19)	

-----Flow Entering Merge Influence Area-----

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4386	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.6 \text{ pc/mi/ln}$$

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

-----Speed Estimation-----

Intermediate speed variable,	M <sub>S</sub> = 0.259	
Space mean speed in ramp influence area,	S <sub>R</sub> = 51.6	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 51.5	mph
Space mean speed for all vehicles,	S = 51.6	mph

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### Diverge Analysis

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3496	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	792	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	844	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3496	792	844	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	971	220	234	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	4234	959	1022	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)

EQ

P = 0.610 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2957$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4234	6750	No
$v_{FO} = v_F - v_R$	3275	6750	No
$v_R$	959	2100	No
$v_3$ or $v_{av34}$	1277 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, $v_{12A} = 2957$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2957	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 19.8$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.384$	
Space mean speed in ramp influence area,	$S_R = 50.0$	mph
Space mean speed in outer lanes,	$S_0 = 59.3$	mph
Space mean speed for all vehicles,	$S = 52.5$	mph



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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2704	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	844	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	1652	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1780	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2704	844	1652	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	751	234	459	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	3275	1022	2001	pcph

#### Estimation of V12 Merge Areas

$$L = 7408.37 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.844 \text{ Using Equation 3}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2765 \text{ pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4297	6750	No
$v_3 \text{ or } v_{av34}$	510 pc/h	(Equation 13-14 or 13-17)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2765$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	4297	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.1 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$M_S = 0.358$	
Space mean speed in ramp influence area,	$S_R = 50.3$	mph
Space mean speed in outer lanes,	$S_0 = 55.0$	mph
Space mean speed for all vehicles,	$S = 50.9$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2704	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	844	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	792	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2220	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2704	844	792	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	751	234	220	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	3275	1022	959	pcph

-----Estimation of V12 Merge Areas-----

$$L = 1536.96 \text{ (Equation 13-6 or 13-7)}$$

$$EQ$$

$$P = 0.619 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2029 \text{ pc/h}$$

-----Capacity Checks-----

	Actual	Maximum	LOS F?
v <sub>FO</sub>	4297	6750	No
v <sub>3</sub> or v <sub>av34</sub>	1246 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> = 2029		(Equation 13-15, 13-16, 13-18, or 13-19)	

-----Flow Entering Merge Influence Area-----

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4297	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 19.4 \text{ pc/mi/ln}$$

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

-----Speed Estimation-----

Intermediate speed variable,	M <sub>S</sub> = 0.268	
Space mean speed in ramp influence area,	S <sub>R</sub> = 51.5	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 52.3	mph
Space mean speed for all vehicles,	S = 51.7	mph

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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: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5250	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	896	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	825	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)	5250		896		825	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1458		249		229	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	6358	1085	999	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

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

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2456 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6358	9000	No
$v_{FO} = v_F - v_R$	5273	9000	No
$v_R$	1085	4200	No
$v_3$ or $v_{av34}$	1951 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, $v_{12A} = 2543$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	2543	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 L_D = -14.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.396$	
Space mean speed in ramp influence area,	$S_R = 49.9$	mph
Space mean speed in outer lanes,	$S_0 = 56.8$	mph
Space mean speed for all vehicles,	$S = 53.8$	mph

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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: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5250	vph

### Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	896	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	1895	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3100	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	5250		896		1895	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	1458		249		526	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	6358	1085	2295	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 13-12 or 13-13)

EQ

P = 0.260 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 2456$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6358	9000	No
$v_{FO} = v_F - v_R$	5273	9000	No
$v_R$	1085	4200	No
$v_3$ or $v_{av34}$	1951 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, $v_{12A} = 2543$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12A}$	2543	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = -14.4$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.396$	
Space mean speed in ramp influence area,	$S_R = 49.9$	mph
Space mean speed in outer lanes,	$S_0 = 56.8$	mph
Space mean speed for all vehicles,	$S = 53.8$	mph



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### \_\_\_\_\_Merge 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: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4354	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	825	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	896	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1950	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4354	825	896	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1209	229	249	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5273	999	1085	pcph

# Estimation of V12 Merge Areas

L = 1959.61 (Equation 13-6 or 13-7)

EQ

P = 0.619 Using Equation 2

FM

v = v (P ) = 3263 pc/h

12 F FM

# Capacity Checks

	Actual	Maximum	LOS F?
v	6272	6750	No
FO			
v or v	2010 pc/h	(Equation 13-14 or 13-17)	
3 av34			
Is v or v	> 2700 pc/h?	No	
3 av34			
Is v or v	> 1.5 v /2	No	
3 av34	12		
If yes, v	= 3263	(Equation 13-15, 13-16, 13-18, or 13-19)	
12A			

# Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	6272	4600	No
R12			

# Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 28.9 pc/mi/ln

R R 12 A

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

# Speed Estimation

Intermediate speed variable,	M = 0.463	
	S	
Space mean speed in ramp influence area,	S = 49.0	mph
	R	
Space mean speed in outer lanes,	S = 49.6	mph
	0	
Space mean speed for all vehicles,	S = 49.2	mph

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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 SB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5569	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	771	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1796	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5569	771	1796	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1547	214	499	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	6745	934	2175	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.548 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 4121 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6745	6750	No
$v_{FO} = v_F - v_R$	5811	6750	No
$v_R$	934	2100	No
$v_3$ or $v_{av34}$	2624 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, $v_{12A} = 4121$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4121	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 29.8$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D = 0.382$	
Space mean speed in ramp influence area,	$S_R = 50.0$	mph
Space mean speed in outer lanes,	$S_0 = 54.0$	mph
Space mean speed for all vehicles,	$S = 51.5$	mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: AM  
Freeway/Dir of Travel: I-385 SB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	55.0	mph	
Volume on freeway	4798	vph	

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	45.0	mph	
Volume on ramp	1796	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	2730	vph	
Position of adjacent Ramp	Downstream		
Type of adjacent Ramp	Off		
Distance to adjacent Ramp	1780	ft	

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4798	1796	2730	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1333	499	758	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5811	2175	3306	pcph

#### Estimation of V12 Merge Areas

$L = 12239.91$  Equation 13-6 or 13-7)  
 EQ  
 $P = 1.000$  Using Equation 3  
 FM  
 $v_{12} = v_F (P_{FM}) = 5811$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	7986	6750	Yes
$v_3$ 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, $v_{12A} = 5811$		(Equation 13-15, 13-16, 13-18, or 13-19)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
$v_{R12}$	7986	4600	Yes

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 57.4$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence F

#### Speed Estimation

Intermediate speed variable,	$M_S = 11.650$
Space mean speed in ramp influence area,	$S_R = -96.5$ mph
Space mean speed in outer lanes,	$S_0 = 55.0$ mph
Space mean speed for all vehicles,	$S =$ mph

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### \_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: JP  
Agency/Co.: Florence & Hutcheson  
Date performed: 4/5/2011  
Analysis time period: PM  
Freeway/Dir of Travel: I-385 SB  
Junction: Roper Mtn Rd  
Jurisdiction: Greenville, SC  
Analysis Year: 2015  
Description: I-85/I-385 No-Build

### \_\_\_\_\_Freeway Data\_\_\_\_\_

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4798	vph

### \_\_\_\_\_On Ramp Data\_\_\_\_\_

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1796	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	771	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2220	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4798	1796	771	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1333	499	214	v
Trucks and buses	18	18	18	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	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	5811	2175	934	pcph

# Estimation of V12 Merge Areas

L = 2326.40 (Equation 13-6 or 13-7)

EQ

P = 0.613 Using Equation 2

FM

v = v (P ) = 3560 pc/h

12 F FM

# Capacity Checks

	Actual	Maximum	LOS F?
v	7986	6750	Yes
FO			
v or v	2251 pc/h	(Equation 13-14 or 13-17)	
3 av34			
Is v or v	> 2700 pc/h?	No	
3 av34			
Is v or v	> 1.5 v /2	No	
3 av34	12		
If yes, v	= 3560	(Equation 13-15, 13-16, 13-18, or 13-19)	
12A			

# Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	7986	4600	Yes
R12			

# Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 39.8 pc/mi/ln

R R 12 A

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

# Speed Estimation

Intermediate speed variable,	M = 1.393	
	S	
Space mean speed in ramp influence area,	S = 36.9	mph
	R	
Space mean speed in outer lanes,	S = 48.7	mph
	0	
Space mean speed for all vehicles,	S = 39.6	mph