

Existing Conditions

HCS+: Ramps and Ramp Junctions Release 5.4

Phone:
E-mail:

Fax:

 Diverge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 EB
 Junction: Off Ramp to CR 46A
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

 Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	4		
Free-flow speed on freeway	55.0	mph	
Volume on freeway	5200	vph	

 Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	2		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	1010	vph	
Length of first accel/decel lane	500	ft	
Length of second accel/decel lane	500	ft	

 Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	1120	vph	
Position of adjacent ramp	Downstream		
Type of adjacent ramp	Off		
Distance to adjacent ramp	1906	ft	

 Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5200	1010	1120	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1413	274	304	v
Trucks and buses	9	9	9	%
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	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp I-4 EB Off to CR 46A.txt 5907 1147 1272 pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.260 Using Equation 0
 FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 2385 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5907	9000	No
$v_{FO} = v_F - v_R$	4760	9000	No
v_R	1147	3800	No
$v_{3 \text{ or } av34}$	1761 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2385$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2385	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 11.3 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	$D = 0.531$	
Space mean speed in ramp influence area,	$S_R = 48.1$	mph
Space mean speed in outer lanes,	$S_0 = 57.4$	mph
Space mean speed for all vehicles,	$S = 53.2$	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 EB
 Junction: On Ramp from CR 46A
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3070	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	260	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	690	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	4826	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3070	260	690	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	834	71	187	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp I-4 EB On from CR 46A.txt 784 pcph
 3487 295

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.591 Using Equation 1
 FM
 $v_{12} = v_F (P_{FM}) = 2063 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3782	6750	No
$v_{3 \text{ or } av34}$	1424 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2063$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2063	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 20.6 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence c

Speed Estimation

Intermediate speed variable,	$M_S = 0.327$	
Space mean speed in ramp influence area,	$S_R = 50.7$	mph
Space mean speed in outer lanes,	$S_0 = 51.7$	mph
Space mean speed for all vehicles,	$S = 51.1$	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 NB
 Junction: Off Ramp to SR 417 EB & SR 46
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4190	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1120	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1010	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	off	
Distance to adjacent ramp	1906	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4190	1120	1010	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1139	304	274	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp I-4 EB Off to CD Road & 417 EB and SR 46.txt
 4759 1272 1147 pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.450 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P = 2841$ pc/h
 FD

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4759	6750	No
$v_{FO} = v_F - v_R$	3487	6750	No
v_R	1272	3800	No
$v_{3 \text{ or } av34}$	1918 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2841$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2841	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D = 15.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $D = 0.542$
 Space mean speed in ramp influence area, $S_R = 47.9$ mph
 Space mean speed in outer lanes, $S_0 = 56.8$ mph
 Space mean speed for all vehicles, $S = 51.1$ mph

I-4 EB CD Road Off to SR 417 EB.txt
HCS+: Ramps and Ramp Junctions Release 5.4

Phone: _____ Fax: _____
E-mail: _____

_____Diverge Analysis_____

Analyst: Cristina Torres-Reyes
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: I-4 EB CD Road
Junction: Off Ramp to SR 417 EB
Jurisdiction: Seminole County
Analysis Year: 2005
Description: Wekiva Parkway Project Development & Environment Study

_____Freeway Data_____

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1120	vph

_____Off Ramp Data_____

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

_____Adjacent Ramp Data (if one exists)_____

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1120	300		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	311	83		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	1.000	1.000		
Driver population factor, fP	1.00	1.00		

Flow rate, v_p

pcph

Estimation of V_{12} Diverge Areas

$$L = \text{(Equation 25-8 or 25-9)}$$

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

$$V_{12} = v_R + (v_F - v_R) P = 1244 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1244	4500	No
$v_{FO} = v_F - v_R$	911	4500	No
v_R	333	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1244$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1244	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D = 10.5 \text{ pc/mi/ln}$

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

Speed Estimation

Intermediate speed variable,	$D = 0.458$	
Space mean speed in ramp influence area,	$S_R = 49.0$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 49.0$	mph

I-4 EB CD Road Off to SR 417 EB_Diverge.txt

HCS+: Ramps and Ramp Junctions Release 5.4

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 EB CD Road
 Junction: Off Ramp to SR 417 EB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1120	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1120	300		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	304	82		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, vp I-4 EB CD Road Off to SR 417 EB_Diverge.txt 1272 341 pcph

Estimation of V12 Diverge Areas

$L =$ (Equation 25-8 or 25-9)
 $P = 1.000$ Using Equation 0
 $v_{12} = v_R + (v_F - v_R) P = 1272$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1272	4500	No
$v_{FO} = v_F - v_R$	931	4500	No
v_R	341	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1272$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1272	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 10.7$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	$D = 0.459$	
Space mean speed in ramp influence area,	$S_R = 49.0$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 49.0$	mph

I-4 EB On from SR 417 WB.txt
HCS+: Ramps and Ramp Junctions Release 5.4

Phone: _____ Fax: _____
E-mail: _____

_____Diverge Analysis_____

Analyst: Cristina Torres-Reyes
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: SR 417 WB
Junction: Off Ramp to I-4 EB
Jurisdiction: Seminole County
Analysis Year: 2005
Description: wekiva Parkway Project Development & Environment Study

_____Freeway Data_____

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	990	vph

_____Off Ramp Data_____

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	690	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

_____Adjacent Ramp Data (if one exists)_____

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	990	690	vph
Peak-hour factor, PHF	0.92	0.92	
Peak 15-min volume, v15	269	187	
Trucks and buses	9	9	v
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	0.957	
Driver population factor, fP	1.00	1.00	

Flow rate, v_p I-4 EB On from SR 417 WB.txt 1125 784 pcph

Estimation of V12 Diverge Areas

$$L = \text{EQ} \quad (\text{Equation 25-8 or 25-9})$$

$$P = 0.450 \quad \text{Using Equation 0}$$

$$v_{12} = v_R + (v_F - v_R) P = 937 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1125	6750	No
$v_{FO} = v_F - v_R$	341	6750	No
v_R	784	3800	No
$v_{3 \text{ or } av34}$	188 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 937$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	937	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = -1.2$ pc/mi/ln

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

Speed Estimation

Intermediate speed variable,	D = 0.499
Space mean speed in ramp influence area,	$S_R = 48.5$ mph
Space mean speed in outer lanes,	$S_0 = 60.3$ mph
Space mean speed for all vehicles,	$S = 50.2$ mph

I-4 EB On from SR 417 WB_Merge.txt
HCS+: Ramps and Ramp Junctions Release 5.4

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: I-4 NB
Junction: On Ramp from SR 417 WB
Jurisdiction: Seminole County
Analysis Year: 2005
Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3330	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	690	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	870	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	5148	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3330	690	870	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	905	187	236	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp I-4 EB On from SR 417 WB_Merge.txt 988 pcph
 3782 784

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.120 Using Equation 4
 FM
 $v_{12} = v_F (P_{FM}) = 453 \text{ pc/h}$

Capacity Checks

		Actual	Maximum	LOS F?
	v_{FO}	4566	9000	No
	v_3 or v_{av34}	1664 pc/h	(Equation 25-4 or 25-5)	
Is	v_3 or $v_{av34} > 2700 \text{ pc/h?}$		No	
Is	v_3 or $v_{av34} > 1.5 v_{12} / 2$		Yes	
If yes,	$v_{12A} = 1512$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1512	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 19.9 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M = 0.325	
Space mean speed in ramp influence area,	S = 50.8	mph
Space mean speed in outer lanes,	S = 52.7	mph
Space mean speed for all vehicles,	S = 51.7	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 EB
 Junction: On Ramp from SR 46
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4020	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	870	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	690	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	5148	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4020	870	690	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1092	236	187	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fp	1.00	1.00	1.00	

Flow rate, v_p I-4 EB On from SR 46.txt 4566 988 784 pcph

Estimation of V12 Merge Areas

$$L = \text{(Equation 25-2 or 25-3)}$$

$$P = 0.094 \text{ Using Equation 4}$$

$$v_{12} = v_F (P_{FM}) = 431 \text{ pc/h}$$

Capacity Checks

	v_{FO}	Actual	Maximum	LOS F?
		5554	9000	No
	v_3 or v_{av34}	2067 pc/h	(Equation 25-4 or 25-5)	
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}	= 1826	(Equation 25-8)	

Flow Entering Merge Influence Area

	v_{12A}	Actual	Max Desirable	Violation?
		1826	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.8$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	$M = 0.351$	
Space mean speed in ramp influence area,	$S = 50.4$	mph
Space mean speed in outer lanes,	$S = 51.9$	mph
Space mean speed for all vehicles,	$S = 51.1$	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 WB
 Junction: Off Ramp to SR 46
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4850	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	870	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1180	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2793	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4850	870	1180	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1318	236	321	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

I-4 WB Off to SR 46.txt
 Flow rate, vp 5509 988 1340 pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.450 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 3022$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5509	6750	No
$v_{FO} = v_F - v_R$	4521	6750	No
v_R	988	3800	No
$v_{3 \text{ or } av34}$	2487 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		Yes	
If yes, $v_{12A} = 3148$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	3148	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 17.8$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D = 0.517	
Space mean speed in ramp influence area,	S = 48.3	mph
Space mean speed in outer lanes,	S = 55.0	mph
Space mean speed for all vehicles,	S = 51.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: I-4 WB
Junction: On Ramp from SR 46
Jurisdiction: Seminole County
Analysis Year: 2005
Description: Wekiva Parkway PD&E

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3980	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1180	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	870	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	off	
Distance to adjacent Ramp	2793	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3980	1180	870	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1082	321	236	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, v_p I-4 WB On from SR 46.txt 4521 1340 988 pcph

Estimation of V12 Merge Areas

$$L = 904.45 \text{ (Equation 25-2 or 25-3)}$$

$$EQ = 0.591 \text{ Using Equation 1}$$

$$FM = v_{12} (P_{FM}) = 2674 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5861	6750	No
$v_{3 \text{ or } av34}$	1847 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2674$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2674	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 33.0 \text{ pc/mi/ln}$

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

Speed Estimation

Intermediate speed variable,	M = 0.502
Space mean speed in ramp influence area,	$S_S = 48.5 \text{ mph}$
Space mean speed in outer lanes,	$S_R = 50.2 \text{ mph}$
Space mean speed for all vehicles,	$S_0 = 49.0 \text{ mph}$

Phone:
E-mail:

Fax:

Diverge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 WB
 Junction: Off Ramp to SR 417 EB & CR 46A
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3980	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1220	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1180	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3305	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3980	1220	1180	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1082	332	321	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

I-4 WB Off Ramp to SR 417 EB and CR 46A_2.txt
 Flow rate, vp 4521 1386 1340 pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.450 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2797 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4521	6750	No
$v_{FO} = v_F - v_R$	3135	6750	No
v_R	1386	3800	No
$v_{3 \text{ or } av34}$	1724 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2797$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2797	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 14.8 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $D = 0.553$
 Space mean speed in ramp influence area, $S_R = 47.8 \text{ mph}$
 Space mean speed in outer lanes, $S_O = 57.5 \text{ mph}$
 Space mean speed for all vehicles, $S = 51.1 \text{ mph}$

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 WB CD Road
 Junction: Off Ramp to SR 417 EB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1220	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	840	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	1220	840	vph
Peak-hour factor, PHF	0.92	0.92	
Peak 15-min volume, v15	332	228	v
Trucks and buses	9	9	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	0.957	
Driver population factor, fP	1.00	1.00	

Flow rate, vp I-4 WB CD Road Off Ramp to SR 417 EB.txt 1386 954 pcph

Estimation of V12 Diverge Areas

$L =$ (Equation 25-8 or 25-9)

EQ $P = 1.000$ Using Equation 0

FD $v_{12} = v_R + (v_F - v_R) P = 1386$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1386	4500	No
$v_{FO} = v_F - v_R$	432	4500	No
v_R	954	2000	No
v_3 or av_{34}	0	(Equation 25-15 or 25-16)	
Is v_3 or $av_{34} > 2700$ pc/h?		No	
Is v_3 or $av_{34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1386$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1386	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 11.7$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D = 0.514
Space mean speed in ramp influence area,	$S_S = 48.3$ mph
Space mean speed in outer lanes,	$S_R = N/A$ mph
Space mean speed for all vehicles,	$S_0 = 48.3$ mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 WB
 Junction: On Ramp from SR 417 WB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3980	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	920	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	3654	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3980	300	920	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1082	82	250	v
Trucks and buses	9	9	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade				%
Length				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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, v_p I-4 WB On from SR 417 WB.txt 4521 341 1045 pcph

Estimation of V12 Merge Areas

$L =$ (Equation 25-2 or 25-3)
 $P = 0.603$ Using Equation 1
 $v_{12} = v_F (P_{FM}) = 2725$ pc/h

Capacity Checks

		Actual	Maximum	LOS F?
	v_{FO}	4862	6750	No
	v_3 or v_{av34}	1796 pc/h	(Equation 25-4 or 25-5)	
Is	v_3 or v_{av34}	> 2700 pc/h?	No	
Is	v_3 or v_{av34}	> $1.5 v_{12} / 2$	No	
If yes,	$v_{12A} = 2725$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2725	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.6$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	$M = 0.342$	
Space mean speed in ramp influence area,	$S = 50.6$	mph
Space mean speed in outer lanes,	$S = 50.3$	mph
Space mean speed for all vehicles,	$S = 50.5$	mph

I-4 WB On from CR 46A and I-4 WB CD Road.txt
HCS+: Ramps and Ramp Junctions Release 5.4

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: I-4 WB
Junction: On Ramp from SR 46 & CR 46A
Jurisdiction: Seminole County
Analysis Year: 2005
Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4280	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	920	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	300	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	3654	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4280	920	300	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1163	250	82	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, FP	1.00	1.00	1.00	

Flow rate, vp I-4 WB On from CR 46A and I-4 WB CD Road.txt
 4862 1045 341 pcph

Estimation of V12 Merge Areas

$$L = \text{(Equation 25-2 or 25-3)}$$

$$P = 0.087 \text{ Using Equation 4}$$

$$v_{12} = v_F (P_{FM}) = 424 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5907	9000	No
$v_3 \text{ or } v_{av34}$	2219 pc/h	(Equation 25-4 or 25-5)	
Is $v_3 \text{ or } v_{av34} > 2700 \text{ pc/h?}$		No	
Is $v_3 \text{ or } v_{av34} > 1.5 v_{12} / 2$		Yes	
If yes, $v_{12A} = 1944$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1944	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.2 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M = 0.363$
 Space mean speed in ramp influence area, $S_R = 50.3 \text{ mph}$
 Space mean speed in outer lanes, $S_0 = 51.5 \text{ mph}$
 Space mean speed for all vehicles, $S = 50.9 \text{ mph}$

SR 417 EB On Ramp from I-4 EB CD Road_Merge.txt

HCS+: Ramps and Ramp Junctions Release 5.4

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 EB
 Junction: On Ramp from I-4 NB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	840	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, v (vph)	840	300		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	228	82		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade			%	%
Length	%	%	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, v_p SR 417 EB On Ramp from I-4 EB CD Road_Merge.txt
 954 341 pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
 EQ
 P = 1.000 Using Equation 0
 FM
 $v_{12} = v_F (P_{FM}) = 954$ pc/h

Capacity Checks

		Actual	Maximum	LOS F?
		1295	4500	No
		0 pc/h	(Equation 25-4 or 25-5)	
Is	$v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is	$v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes,	$v_{12A} = 954$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	954	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.3$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $M = 0.300$
 Space mean speed in ramp influence area, $S_S = 51.1$ mph
 Space mean speed in outer lanes, $S_R = \text{N/A}$ mph
 Space mean speed for all vehicles, $S_0 = 51.1$ mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 EB
 Junction: Off Ramp to Rinehart Rd
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	80	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1140	80		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	310	22		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	0.00	%	%
Length	0.00	0.00	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, vp SR 417EB off to Rinehart Rd.txt
1295 91 pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
 EQ
 P = 1.000 Using Equation 0
 FD

$$V_{12} = V_R + (V_F - V_R) P_{FD} = 1295 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$V_{Fi} = V_F$	1295	4500	No
$V_{FO} = V_F - V_R$	1204	4500	No
V_R	91	2000	No
$V_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $V_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $V_{3 \text{ or } av34} > 1.5 V_{12} / 2$		No	
If yes, $V_{12A} = 1295$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}	1295	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 V_{12} - 0.009 L_D = 10.9 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $D = 0.436$
 Space mean speed in ramp influence area, $S_S = 49.3 \text{ mph}$
 Space mean speed in outer lanes, $S_R = \text{N/A} \text{ mph}$
 Space mean speed for all vehicles, $S_O = 49.3 \text{ mph}$

Phone: . Fax:
E-mail:

Merge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 EB
 Junction: On Ramp from Rinehart Rd
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1060	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	490	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1060	490		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	288	133		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade			%	%
Length	%	%	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, v_p SR 417EB on Ramp.txt 1204 557 pcph

Estimation of V12 Merge Areas

$L =$ (Equation 25-2 or 25-3)
 EQ
 $P = 1.000$ Using Equation 0
 FM
 $v_{12} = v_{F, FM} (P) = 1204$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1761	4500	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1204$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1204	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.8$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	$M = 0.309$
Space mean speed in ramp influence area,	$S_R = 51.0$ mph
Space mean speed in outer lanes,	$S_0 = N/A$ mph
Space mean speed for all vehicles,	$S = 51.0$ mph

SR 417WB off to Rinehart Rd.txt

HCS+: Ramps and Ramp Junctions Release 5.4

Phone:
E-mail:

Fax:

Diverge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 WB
 Junction: Off Ramp to Rinehart Rd
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1600	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	700	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1600	700		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	435	190		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, vp SR 417WB off to Rinehart Rd.txt 1817 795 pcph

Estimation of V12 Diverge Areas

$$L = \text{(Equation 25-8 or 25-9)}$$

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

$$v_{12} = v_R + (v_F - v_R) P = 1817 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1817	4500	No
$v_{FO} = v_F - v_R$	1022	4500	No
v_R	795	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1817$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1817	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 15.4 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	$D = 0.500$	
Space mean speed in ramp influence area,	$S_R = 48.5$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 48.5$	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 WB
 Junction: On Ramp from Rinehart Rd
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	900	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	90	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	900	90		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	245	24		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade			%	%
Length			mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, v_p SR 417WB on Ramp.txt 1022 102 pcph

Estimation of V12 Merge Areas

$$L = \text{(Equation 25-2 or 25-3)}$$

$$P = 0.591 \text{ Using Equation 1}$$

$$v_{12} = v_F (P_{FM}) = 605 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1124	6750	No
v_3 or v_{av34}	417 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or $v_{av34} > 2700$ pc/h?		No	
Is v_3 or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 605$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	605	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 7.8$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M = 0.294
Space mean speed in ramp influence area,	$S_S = 51.2$ mph
Space mean speed in outer lanes,	$S_R = 55.0$ mph
Space mean speed for all vehicles,	$S_0 = 52.5$ mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 WB
 Junction: On Ramp from Rinehart Rd
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	900	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	90	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	900	90		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	245	24		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade			%	%
Length			mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, FHV	0.957	0.957		
Driver population factor, FP	1.00	1.00		

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.591 Using Equation 1
 FM
 $v_{12} = v_F (P_{FM}) = 605 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1124	6750	No
$v_{3 \text{ or } av34}$	417 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 605$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	605	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 7.8 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M = 0.294
Space mean speed in ramp influence area,	$S_R = 51.2 \text{ mph}$
Space mean speed in outer lanes,	$S_0 = 55.0 \text{ mph}$
Space mean speed for all vehicles,	$S = 52.5 \text{ mph}$

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 EB CD Road
 Junction: Off Ramp to SR 417 EB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1120	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1120	300		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	311	83		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	0.00	%	%
Length	0.00	0.00	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	1.000	1.000		
Driver population factor, fP	1.00	1.00		

Flow rate, vp I-4 EB CD Road Off to SR 417 EB.txt
1244 333 pcph

Estimation of V12 Diverge Areas

$$L = \text{EQ} \quad (\text{Equation 25-8 or 25-9})$$

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

$$V_{12} = V_R + (V_F - V_R) P = 1244 \quad \text{pc/h}$$

Capacity Checks

$V_{12} = V_{12}$	Actual	Maximum	LOS F?
V_{12}	1244	4500	No
$V_{FO} = V_F - V_R$	911	4500	No
V_R	333	2000	No
$V_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $V_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $V_{3 \text{ or } av34} > 1.5 V_{12} / 2$		No	
If yes, $V_{12A} = 1244$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}	1244	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 V_R - 0.009 L_D = 10.5$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D = 0.458
Space mean speed in ramp influence area,	$S_R = 49.0$ mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$ mph
Space mean speed for all vehicles,	$S_0 = 49.0$ mph

SR 417WB off to Rinehart Rd.txt
HCS+: Ramps and Ramp Junctions Release 5.4

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: KNM
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: SR 417 WB
Junction: Off Ramp to Rinehart Rd
Jurisdiction: Seminole County
Analysis Year: 2005
Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1600	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	700	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, v (vph)	1600	700		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	435	190		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	0.00	%	%
Length	0.00	0.00	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Estimation of V12 Diverge Areas

$$L = \text{EQ} \quad (\text{Equation 25-8 or 25-9})$$

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

$$v_{12R} = v_R + (v_F - v_R) P_{FD} = 1817 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{12R} = v_{12F}$	1817	4500	No
$v_{12R} = v_{12F} - v_{12R}$	1022	4500	No
v_R	795	2000	No
$v_{12R} = v_{12R} / 3 \text{ or } v_{12R} / 3.4$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{12R} > 2700$ pc/h?		No	
Is $v_{12R} > 1.5 v_{12R} / 2$		No	
If yes, $v_{12R} = 1817$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1817	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 15.4 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D = 0.500
Space mean speed in ramp influence area,	$S_R = 48.5 \text{ mph}$
Space mean speed in outer lanes,	$S_0 = \text{N/A} \text{ mph}$
Space mean speed for all vehicles,	$S_0 = 48.5 \text{ mph}$

Phone: Fax:
E-mail:

Merge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 EB
 Junction: On Ramp from Rinehart Rd
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1060	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	490	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1060	490		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	288	133		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade			%	%
Length			mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, v_p SR 417EB on Ramp.txt 1204 557 pcph

Estimation of V12 Merge Areas

$L =$ (Equation 25-2 or 25-3)
 EQ
 $P = 1.000$ Using Equation 0
 FM
 $v_{12} = v_F (P_{FM}) = 1204$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1761	4500	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or $v_{av34} > 2700$ pc/h?		No	
Is v_3 or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1204$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1204	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.8$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	$M_S = 0.309$
Space mean speed in ramp influence area,	$S_R = 51.0$ mph
Space mean speed in outer lanes,	$S_0 = N/A$ mph
Space mean speed for all vehicles,	$S = 51.0$ mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 EB
 Junction: Off Ramp to Rinehart Rd
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	80	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1140	80		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	310	22		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	0.00	%	%
Length	0.00	0.00	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

Flow rate, vp SR 417EB off to Rinehart Rd.txt
 1295 91 pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
 EQ
 P = 1.000 Using Equation 0
 FD

$$V_{12} = V_R + (V_F - V_R) P_{FD} = 1295 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$V_{Fi} = V_F$	1295	4500	No
$V_{FO} = V_F - V_R$	1204	4500	No
V_R	91	2000	No
V_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
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, $v_{12A} = 1295$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1295	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 10.9 \text{ pc/mi/ln}$

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

Speed Estimation

Intermediate speed variable,	$D = 0.436$	
Space mean speed in ramp influence area,	$S_R = 49.3$	mph
Space mean speed in outer lanes,	$S_O = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 49.3$	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: SR 417 EB
 Junction: On Ramp from I-4 NB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	840	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	840	300	vph
Peak-hour factor, PHF	0.92	0.92	
Peak 15-min volume, v15	228	82	v
Trucks and buses	9	9	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	0.957	
Driver population factor, fP	1.00	1.00	

Flow rate, vp

pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 1.000 Using Equation 0
FM
 $v_{12} = v_F (P_{FM}) = 954 \text{ pc/h}$

Capacity Checks

		Actual 1295	Maximum 4500	LOS F? No
	v_{FO}			
	$v_3 \text{ or } v_{av34}$	0 pc/h	(Equation 25-4 or 25-5)	
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,	$v_{12A} = 954$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	954	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.3 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M = 0.300	
Space mean speed in ramp influence area,	S _R = 51.1 mph	
Space mean speed in outer lanes,	S ₀ = N/A mph	
Space mean speed for all vehicles,	S = 51.1 mph	

HCS+: Ramps and Ramp Junctions Release 5.4

Phone:
E-mail:

Fax:

 Merge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 WB
 Junction: On Ramp from SR 417 WB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

 Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	55.0	mph	
Volume on freeway	3980	vph	

 On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	35.0	mph	
Volume on ramp	300	vph	
Length of first accel/decel lane	900	ft	
Length of second accel/decel lane		ft	

 Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent Ramp	920	vph	
Position of adjacent Ramp	Downstream		
Type of adjacent Ramp	On		
Distance to adjacent Ramp	3654	ft	

 Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3980	300	920	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1082	82	250	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp I-4 WB On from SR 417 WB.txt 4521 341 1045 pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.603 Using Equation 1
 FM
 $v_{12} = v_F (P_{FM}) = 2725 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4862	6750	No
v_3 or v_{av34}	1796 pc/h	(Equation 25-4 or 25-5)	
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, $v_{12A} = 2725$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2725	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.6 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M = 0.342$
 Space mean speed in ramp influence area, $S_R = 50.6 \text{ mph}$
 Space mean speed in outer lanes, $S_0 = 50.3 \text{ mph}$
 Space mean speed for all vehicles, $S = 50.5 \text{ mph}$

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Cristina Torres-Reyes
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: I-4 WB
Junction: On Ramp from SR 46
Jurisdiction: Seminole County
Analysis Year: 2005
Description: Wekiva Parkway PD&E

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3980	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	1180	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	870	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2793	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3980	1180	870	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1082	321	236	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, FP	1.00	1.00	1.00	

Flow rate, v_p I-4 WB On from SR 46.txt 4521 1340 988 pcph

Estimation of V12 Merge Areas

$$L = 904.45 \text{ (Equation 25-2 or 25-3)}$$

$$P = 0.591 \text{ Using Equation 1}$$

$$v_{12} = v_{F, FM} (P) = 2674 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5861	6750	No
$v_{3 \text{ or } av34}$	1847 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2674$		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2674	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 33.0$ pc/mi/ln

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

Speed Estimation

Intermediate speed variable, $M = 0.502$

Space mean speed in ramp influence area, $S_R = 48.5$ mph

Space mean speed in outer lanes, $S_0 = 50.2$ mph

Space mean speed for all vehicles, $S = 49.0$ mph

I-4 WB On from CR 46A and I-4 WB CD Road.txt
HCS+: Ramps and Ramp Junctions Release 5.4

Phone: _____ Fax: _____
E-mail: _____

Merge Analysis

Analyst: Cristina Torres-Reyes
Agency/Co.: HNTB
Date performed: 10/31/2006
Analysis time period: Existing Conditions
Freeway/Dir of Travel: I-4 WB
Junction: On Ramp from SR 46 & CR 46A
Jurisdiction: Seminole County
Analysis Year: 2005
Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4280	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	920	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	300	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	3654	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4280	920	300	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1163	250	82	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

HCS+: Ramps and Ramp Junctions Release 5.4

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: KNM
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 WB
 Junction: Off Ramp to SR 46
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4850	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	870	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1180	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2793	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4850	870	1180	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1318	236	321	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp I-4 WB Off to SR 46.txt
5509 988 1340 pcph

Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.450 Using Equation 0
 FD

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 3022 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5509	6750	No
$v_{FO} = v_F - v_R$	4521	6750	No
v_R	988	3800	No
$v_{3 \text{ or } av34}$	2487 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700 \text{ pc/h?}$		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		Yes	
If yes, $v_{12A} = 3148$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	3148	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D = 17.8 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $D = 0.517$
 Space mean speed in ramp influence area, $S_S = 48.3 \text{ mph}$
 Space mean speed in outer lanes, $S_R = 55.0 \text{ mph}$
 Space mean speed for all vehicles, $S_0 = 51.0 \text{ mph}$

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Cristina Torres-Reyes
 Agency/Co.: HNTB
 Date performed: 10/31/2006
 Analysis time period: Existing Conditions
 Freeway/Dir of Travel: I-4 EB CD Road
 Junction: Off Ramp to SR 417 EB
 Jurisdiction: Seminole County
 Analysis Year: 2005
 Description: Wekiva Parkway Project Development & Environment Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1120	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1120	300		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	304	82		v
Trucks and buses	9	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	0.00	%	%
Length	0.00	0.00	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.957	0.957		
Driver population factor, fP	1.00	1.00		

I-4 EB CD Road Off to SR 417 EB_Diverge.txt
 Flow rate, v_p 1272 341 pcph

Estimation of V12 Diverge Areas

$L =$ (Equation 25-8 or 25-9)
 $P = 1.000$ Using Equation 0
 $v_{12} = v_R + (v_F - v_R) P = 1272$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{F1} = v_F$	1272	4500	No
$v_{FO} = v_F - v_R$	931	4500	No
v_R	341	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 1272$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1272	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 10.7$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	$D = 0.459$	
Space mean speed in ramp influence area,	$S_R = 49.0$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 49.0$	mph