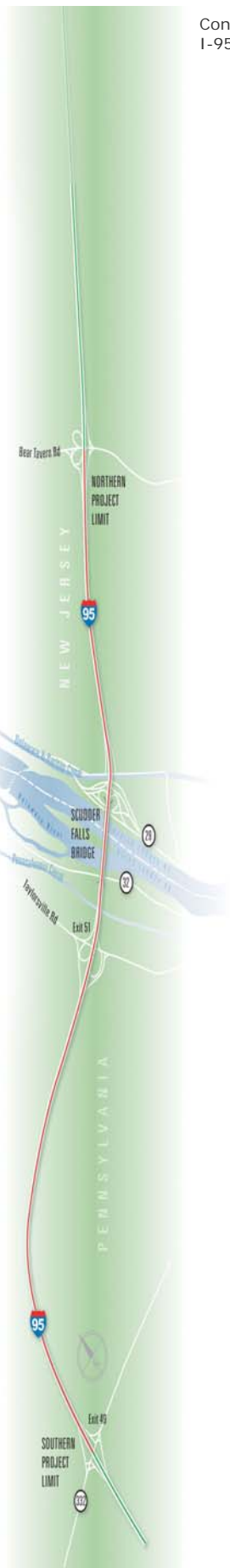


## Technical Memorandum No. 28 – Point of Access Study



Contract C-393A, Capital Project No. CP0301A, Account No. 7161-06-012  
I-95/Scudder Falls Bridge Improvement Project

### I-95 Mainline Analysis 2003 Existing AM Peak



Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/25/2004  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	2834	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	770	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1586	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	1586	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.4	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

Operational Analysis

---

Analyst: Jason Wiggins  
 Agency or Company: DMJM+HARRIS  
 Date Performed: 2/25/2004  
 Analysis Time Period: AM Peak  
 Freeway/Direction: I-95 Northbound  
 From/To: btw exits 49 & 51  
 Jurisdiction: Bucks County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3191	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	867	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1786	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1786	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.0	mi/h
Number of lanes, N	2	
Density, D	27.9	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

Operational Analysis

---

Analyst: Jason Wiggins  
 Agency or Company: DMJM+HARRIS  
 Date Performed: 2/25/2004  
 Analysis Time Period: AM Peak  
 Freeway/Direction: I-95 Northbound  
 From/To: btw exits 51 & 1  
 Jurisdiction: Bucks County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5111	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1389	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2861	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2861	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS

F

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

Operational Analysis

---

Analyst: Jason Wiggins  
 Agency or Company: DMJM+HARRIS  
 Date Performed: 2/25/2004  
 Analysis Time Period: AM Peak  
 Freeway/Direction: I-95 Northbound  
 From/To: btw exits 1 & 2  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4744	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1289	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1822	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fn	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1822	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.6	mi/h
Number of lanes, N	3	
Density, D	27.0	pc/mi/ln



Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

Operational Analysis

---

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/25/2004  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4500	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1223	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1679	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1679	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.0	mi/h
Number of lanes, N	3	
Density, D	24.3	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

Operational Analysis

---

Analyst: Jason Wiggins  
 Agency or Company: DMJM+HARRIS  
 Date Performed: 2/25/2004  
 Analysis Time Period: AM Peak  
 Freeway/Direction: I-95 Southbound  
 From/To: btw exits 3 & 2  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	1578	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	429	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	589	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	589	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	8.4	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

Operational Analysis

---

Analyst: Jason Wiggins  
 Agency or Company: DMJM+HARRIS  
 Date Performed: 2/25/2004  
 Analysis Time Period: AM Peak  
 Freeway/Direction: I-95 Southbound  
 From/To: btw exits 2 & 1  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	1405	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	382	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	524	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	524	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	7.5	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

### Operational Analysis

---

Analyst: Jason Wiggins  
 Agency or Company: DMJM+HARRIS  
 Date Performed: 2/25/2004  
 Analysis Time Period: AM Peak  
 Freeway/Direction: I-95 Southbound  
 From/To: btw exits 1 & 51  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

### Flow Inputs and Adjustments

---

Volume, V	1394	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	379	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	780	pc/h/ln

---

### Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

### LOS and Performance Measures

---

Flow rate, vp	780	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.0	pc/mi/ln



Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/25/2004  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	1540	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	418	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	862	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	862	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.3	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

---

Operational Analysis

---

Analyst: Jason Wiggins  
 Agency or Company: DMJM+HARRIS  
 Date Performed: 2/25/2004  
 Analysis Time Period: AM Peak  
 Freeway/Direction: I-95 Southbound  
 From/To: btw exits 49 & 46  
 Jurisdiction: Bucks County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2440	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	663	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1366	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1366	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.0	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

### Diverge Analysis

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Northbound  
 Junction: NB off ramp to PA 332  
 Jurisdiction: Bucks County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2834	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	915	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1272	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2834	915	1272	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	770	249	346	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3173	1029	1410	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 3173 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3173	4700	No
$v_{12}$	3173	4400	No
$v_{FO} = v_F - v_R$	2144	4700	No
$v_R$	1029	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 23.9 \text{ pc/mi/ln}$   
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	$D = 0.521$	
	$S$	
Space mean speed in ramp influence area,	$S_R = 53.0$	mph
	$R$	
Space mean speed in outer lanes,	$S_0 = N/A$	mph
	$0$	
Space mean speed for all vehicles,	$S = 53.0$	mph

Phone:  
E-mail:

Fax:

### Merge Analysis

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Northbound  
 Junction: NB On ramp from PA332  
 Jurisdiction: Bucks County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

### Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1919	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	1272	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	915	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1919	1272	915	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	521	346	249	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2148	1410	1029	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FM$   
 $v_{12} = v_F (P_{FM}) = 2148 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3558	4700	No
$v_{R12}$	3558	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.0 \text{ pc/mi/ln}$   
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	$M = 0.362$	
	$S$	
Space mean speed in ramp influence area,	$S = 56.7$	mph
	$R$	
Space mean speed in outer lanes,	$S = N/A$	mph
	$O$	
Space mean speed for all vehicles,	$S = 56.7$	mph

Phone:  
E-mail:

Fax:

### Diverge Analysis

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Northbound  
 Junction: NB off ramp to Taylorsville  
 Jurisdiction: Bucks County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3191	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	144	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1096	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3191	144	1096	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	867	39	298	v
Trucks and buses	6	5	6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3573	160	1227	pcph

# Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)  
EQ  
P = 1.000 Using Equation 0  
FD  
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 3573 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3573	4700	No
$v_{12}$	3573	4400	No
$v_{FO} = v_F - v_R$	3413	4700	No
$v_R$	160	2000	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 27.3 \text{ pc/mi/ln}$   
Level of service for ramp-freeway junction areas of influence C

# Speed Estimation

Intermediate speed variable,	D = 0.442	
Space mean speed in ramp influence area,	S = 54.8	mph
Space mean speed in outer lanes,	S = N/A	mph
Space mean speed for all vehicles,	S = 54.8	mph

HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

Merge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3047	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	1096	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	144	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3047	1096	144	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	828	298	39	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3411	1227	160	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 3411$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4638	4700	No
$v_{R12}$	4638	4600	Yes

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 38.2$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence F

#### Speed Estimation

Intermediate speed variable,	$M = 0.692$	
	S	
Space mean speed in ramp influence area,	$S = 49.1$	mph
	R	
Space mean speed in outer lanes,	$S = N/A$	mph
	O	
Space mean speed for all vehicles,	$S = 49.1$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

---

Merge Analysis

---

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Northbound  
 Junction: NB On ramp from Taylorsville W  
 Jurisdiction: Bucks County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4143	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	968	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1096	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)	4143	968	1096	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1126	263	298	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4638	1073	1227	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 4638$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5711	4700	Yes
$v_{R12}$	5711	4600	Yes

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 47.8$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence F

#### Speed Estimation

Intermediate speed variable,	$M = 1.480$	
	S	
Space mean speed in ramp influence area,	$S = 31.0$	mph
	R	
Space mean speed in outer lanes,	$S = N/A$	mph
	O	
Space mean speed for all vehicles,	$S = 31.0$	mph

Phone:  
E-mail:

Fax:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5112	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	709	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	128	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5112	709	128	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1389	193	35	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5723	790	142	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 5723$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5723	4800	Yes
$v_{12}$	5723	4400	Yes
$v_{FO} = v_F - v_R$	4933	4800	Yes
$v_R$	790	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 48.5$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence F

#### Speed Estimation

Intermediate speed variable,	$D = 0.499$	
	$S$	
Space mean speed in ramp influence area,	$S = 56.0$	mph
	$R$	
Space mean speed in outer lanes,	$S = N/A$	mph
	$O$	
Space mean speed for all vehicles,	$S = 56.0$	mph

Phone:  
E-mail:

Fax:

### Merge Analysis

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Northbound  
 Junction: NB On ramp from NJ 29  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

### Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4402	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	128	vph
Length of first accel/decel lane	1700	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	709	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4402	128	709	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1196	35	193	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4928	142	790	pcph

---

Estimation of V12 Merge Areas

---

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 4928$  pc/h

---

Capacity Checks

---

	Actual	Maximum	LOS F?
$v_{FO}$	5070	4800	Yes
$v_{R12}$	5070	4600	Yes

---

Level of Service Determination (if not F)

---

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 34.3$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence F

---

Speed Estimation

---

Intermediate speed variable,	$M = 0.823$	
	S	
Space mean speed in ramp influence area,	$S = 47.0$	mph
	R	
Space mean speed in outer lanes,	$S = N/A$	mph
	O	
Space mean speed for all vehicles,	$S = 47.0$	mph

---

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

---

Merge Analysis

---

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Northbound  
 Junction: NB On ramp from Upper River Rd  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4530	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	214	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	128	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1640	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4530	214	128	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1231	58	35	v
Trucks and buses	6	12	4	%
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	0.971	0.943	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5072	247	142	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 $EQ$   
 $P = 0.591$  Using Equation 1  
 $FM$   
 $v_{12} = v_F (P_{FM}) = 3000$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5319	7200	No
$v_{R12}$	3247	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.6$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	$M = 0.386$	
	$S$	
Space mean speed in ramp influence area,	$S = 59.2$	mph
	$R$	
Space mean speed in outer lanes,	$S = 64.3$	mph
	$O$	
Space mean speed for all vehicles,	$S = 61.1$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

### Diverge Analysis

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Northbound  
 Junction: NB Off Ramp to Bear Tavern Rd  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4744	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	822	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	578	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4744	822	578	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1289	223	157	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5311	907	641	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 0.586$  Using Equation 5  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 3486$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5311	7200	No
$v_{12}$	3486	4400	No
$v_{FO} = v_F - v_R$	4404	7200	No
$v_R$	907	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 23.3$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	$D = 0.510$	
Space mean speed in ramp influence area,	$S_R = 55.7$	mph
Space mean speed in outer lanes,	$S_O = 73.6$	mph
Space mean speed for all vehicles,	$S = 60.8$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3922	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	578	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	822	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3922	578	822	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1066	157	223	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4391	641	907	pcph

#### Estimation of V12 Merge Areas

$L = 1015.65$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 0.610$  Using Equation 1  
 FM  
 $v_{12} = v_F (P_{FM}) = 2677$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	5032	7200	No
$v_{R12}$	3318	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.9$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	$M = 0.348$	
	S	
Space mean speed in ramp influence area,	$S = 60.3$	mph
	R	
Space mean speed in outer lanes,	$S = 65.6$	mph
	O	
Space mean speed for all vehicles,	$S = 62.0$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1211	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	194	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	430	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1211	194	430	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	329	53	117	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1356	213	481	pcph

#### Estimation of V12 Merge Areas

$L = 298.10$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 0.611$  Using Equation 1  
 FM  
 $v_{12} = v_F (P_{FM}) = 829$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	1569	7200	No
$v_{R12}$	1042	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 6.0$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence A

#### Speed Estimation

Intermediate speed variable,	$M = 0.248$	
	S	
Space mean speed in ramp influence area,	$S = 63.1$	mph
	R	
Space mean speed in outer lanes,	$S = 69.9$	mph
	O	
Space mean speed for all vehicles,	$S = 65.2$	mph

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date Performed: 2/16/2004  
Analysis Time Period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	304	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.30	
Weaving ratio, R	0.13	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	1148	0	430	63	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	312	0	117	17	v
Trucks and buses	6	10	6	4	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.971	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1285	0	481	69	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	1.05	0.40
Weaving and non-weaving speeds, Si	44.24	57.99
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.08
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	53.05	mph
Weaving segment density, D	8.65	pc/mi/ln
Level of service, LOS	A	
Capacity of base condition, cb	6098	pc/h
Capacity as a 15-minute flow rate, c	5920	pc/h
Capacity as a full-hour volume, ch	5446	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	550	2800	a
Average flow rate (pcphpl)	458	2400	b
Volume ratio, VR	0.30	0.35	c
Weaving ratio, R	0.13	N/A	d
Weaving length (ft)	304	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone:  
E-mail:

Fax:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1405	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	309	vph
Length of first accel/decel lane	2000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	298	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1405	309	298	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	382	84	81	v
Trucks and buses	6	11	4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1573	354	330	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 0.704$  Using Equation 5  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P = 1213$  pc/h  
 $FD$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1573	7200	No
$v_{12}$	1213	4400	No
$v_{FO} = v_F - v_R$	1219	7200	No
$v_R$	354	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = -3.3$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence A

#### Speed Estimation

Intermediate speed variable,	$D = 0.460$	
Space mean speed in ramp influence area,	$S_R = 57.1$	mph
Space mean speed in outer lanes,	$S_O = 76.8$	mph
Space mean speed for all vehicles,	$S = 60.7$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

---

Merge Analysis

---

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date performed: 2/15/2004  
 Analysis time period: AM Peak  
 Freeway/Dir of Travel: I-95 Southbound  
 Junction: SB On ramp from NJ 29  
 Jurisdiction: Mercer County  
 Analysis Year: 2003 Existing  
 Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1096	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	298	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	309	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1096	298	309	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	298	81	84	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1227	330	354	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 1227$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
v	1557	4800	No
FO			
v	1557	4600	No
R12			

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.3$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M = 0.316	
	S	
Space mean speed in ramp influence area,	S = 61.2	mph
	R	
Space mean speed in outer lanes,	S = N/A	mph
	0	
Space mean speed for all vehicles,	S = 61.2	mph

Phone:  
E-mail:

Fax:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville W  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1394	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	118	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	72	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	790	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1394	118	72	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	379	32	20	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1561	131	81	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1561$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{Fi}$	1561	4700	No
$v_{12}$	1561	4400	No
$v_{FO} = v_F - v_R$	1430	4700	No
$v_R$	131	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 12.7$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$D = 0.440$	
Space mean speed in ramp influence area,	$S_R = 54.9$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 54.9$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1276	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	72	vph
Length of first accel/decel lane	100	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	336	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1276	72	336	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	347	20	91	v
Trucks and buses	6	7	3	%
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	0.971	0.966	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1429	81	371	pcph

### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) \frac{P}{FD} = 1429$  pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_F$	1429	4700	No
$v_{12}$	1429	4400	No
$v_{FO} = v_F - v_R$	1348	4700	No
$v_R$	81	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 15.6$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

### Speed Estimation

Intermediate speed variable,	$D = 0.435$	
Space mean speed in ramp influence area,	$S_R = 55.0$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 55.0$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1204	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	336	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	72	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1204	336	72	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	327	91	20	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1348	371	81	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FM$   
 $v_{12} = v_F (P_{FM}) = 1348$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	1719	4700	No
$v_{R12}$	1719	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 10.8$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$M = 0.254$	
Space mean speed in ramp influence area,	$S_R = 59.2$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 59.2$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1540	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	445	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1345	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1540	445	1345	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	418	121	365	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1724	501	1506	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1724$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_F$	1724	4700	No
$v_{12}$	1724	4400	No
$v_{FO} = v_F - v_R$	1223	4700	No
$v_R$	501	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 11.4$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$D = 0.473$	
Space mean speed in ramp influence area,	$S_R = 54.1$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 54.1$	mph

## HCS2000: Ramps and Ramp Junctions Release 4.1d

Phone:  
E-mail:

Fax:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1095	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	1345	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	445	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1095	1345	445	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	298	365	121	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1226	1506	501	pcph

# Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FM$   
 $v_{12} = v_F (P_{FM}) = 1226 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	2732	4700	No
$v_{R12}$	2732	4600	No

# Level of Service Determination (if not F)

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 17.5 \text{ pc/mi/ln}$   
 Level of service for ramp-freeway junction areas of influence B

# Speed Estimation

Intermediate speed variable,	$M_S = 0.285$
Space mean speed in ramp influence area,	$S_R = 58.5 \text{ mph}$
Space mean speed in outer lanes,	$S_O = N/A \text{ mph}$
Space mean speed for all vehicles,	$S = 58.5 \text{ mph}$

## TWO-WAY STOP CONTROL SUMMARY

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date Performed: 2/17/2004  
 Analysis Time Period: AM Peak  
 Intersection: I-95 NB Off Ramp  
 Jurisdiction: Mercer County  
 Units: U. S. Customary  
 Analysis Year: 2003 Existing  
 Project ID: Scudder Falls  
 East/West Street: NJ 29  
 North/South Street: off ramp  
 Intersection Orientation: EW

Study period (hrs): 0.25

## Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Eastbound				Westbound	
		1	2	3	4	5	6
		L	T	R	L	T	R
Volume						206	
Peak-Hour Factor, PHF						0.92	
Hourly Flow Rate, HFR						223	
Percent Heavy Vehicles		--	--			--	--
Median Type/Storage		Undivided		/			
RT Channelized?							
Lanes						1	
Configuration						T	
Upstream Signal?			No			No	

Minor Street:	Approach Movement	Northbound				Southbound	
		7	8	9	10	11	12
		L	T	R	L	T	R
Volume						562	
Peak Hour Factor, PHF						0.92	
Hourly Flow Rate, HFR						610	
Percent Heavy Vehicles						0	
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage					/		/
Lanes						1	
Configuration						T	

## Delay, Queue Length, and Level of Service

Approach Movement	EB		WB		Northbound			Southbound		
	1	4	7	8	9	10	11	12		
Lane Config							T			
v (vph)							610			
C(m) (vph)							679			
v/c							0.90			
95% queue length							11.41			
Control Delay							39.1			
LOS							E			
Approach Delay							39.1			
Approach LOS							E			

## HCS+: Unsignalized Intersections Release 5.21

Phone:  
E-Mail:

Fax:

## TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date Performed: 2/17/2004  
Analysis Time Period: AM Peak  
Intersection: I-95 NB Off Ramp  
Jurisdiction: Mercer County  
Units: U. S. Customary  
Analysis Year: 2003 Existing  
Project ID: Scudder Falls  
East/West Street: NJ 29  
North/South Street: off ramp  
Intersection Orientation: EW

Study period (hrs): 0.25

## Vehicle Volumes and Adjustments

Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R
------------------------	--------	--------	--------	--------	--------	--------

Volume					206	
Peak-Hour Factor, PHF					0.92	
Peak-15 Minute Volume					56	
Hourly Flow Rate, HFR					223	
Percent Heavy Vehicles	--	--	--	--	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes					1	
Configuration					T	
Upstream Signal?		No			No	

Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
------------------------	--------	--------	--------	---------	---------	---------

Volume					562	
Peak Hour Factor, PHF					0.92	
Peak-15 Minute Volume					153	
Hourly Flow Rate, HFR					610	
Percent Heavy Vehicles					0	
Percent Grade (%)	0				0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?						
Lanes					1	
Configuration					T	

## Pedestrian Volumes and Adjustments

Movements	13	14	15	16
-----------	----	----	----	----

Flow (ped/hr)	0	0	0	0
---------------	---	---	---	---

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

### Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

### Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)							6.5	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)							0	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)							0.00	
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage							6.5	
2-stage								

Follow-Up Time Calculations								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)							4.00	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)							0	
t(f)							4.0	

### Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				

Total Saturation Flow Rate, s (vph)  
 Arrival Type  
 Effective Green, g (sec)  
 Cycle Length, C (sec)  
 Rp (from Exhibit 16-11)  
 Proportion vehicles arriving on green P  
 g(q1)  
 g(q2)  
 g(q)

---

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

---

alpha  
 beta  
 Travel time, t(a) (sec)  
 Smoothing Factor, F  
 Proportion of conflicting flow, f  
 Max platooned flow, V(c,max)  
 Min platooned flow, V(c,min)  
 Duration of blocked period, t(p)  
 Proportion time blocked, p

	0.000	0.000
--	-------	-------

---

Computation 3-Platoon Event Periods      Result

---

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

---

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Process Stage II
---	--------------------------------	-------------------------------------	----------------------------

---

p(1)  
 p(4)  
 p(7)  
 p(8)  
 p(9)  
 p(10)  
 p(11)  
 p(12)

---

Computation 4 and 5  
 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

---

V c, x	223							
s								
Px								
V c, u, x								

---

C r, x  
 C plat, x

---

Two-Stage Process	7	8	10	11
-------------------	---	---	----	----

Stage1 Stage2 Stage1 Stage2 Stage1 Stage2 Stage1 Stage2

V(c,x)  
s  
P(x)  
V(c,u,x)  
  
C(r,x)  
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		223
Potential Capacity		679
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		679
Probability of Queue free St.	1.00	0.10
Step 4: LT from Minor St.	7	10
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.10	
Maj. L, Min T Adj. Imp Factor.	0.22	
Cap. Adj. factor due to Impeding mvmnt	0.22	1.00
Movement Capacity		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		



---

Part 2 - Second Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor  
 Cap. Adj. factor due to Impeding mvmnt  
 Movement Capacity

---

Part 3 - Single Stage  
 Conflicting Flows 223  
 Potential Capacity 679  
 Pedestrian Impedance Factor 1.00 1.00  
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00  
 Movement Capacity 679

---

Result for 2 stage process:

a  
 y  
 C t 679  
 Probability of Queue free St. 1.00 0.10

---

Step 4: LT from Minor St. 7 10

---

Part 1 - First Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor  
 Cap. Adj. factor due to Impeding mvmnt  
 Movement Capacity

---

Part 2 - Second Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor  
 Cap. Adj. factor due to Impeding mvmnt  
 Movement Capacity

---

Part 3 - Single Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor 1.00 1.00  
 Maj. L, Min T Impedance factor 0.10  
 Maj. L, Min T Adj. Imp Factor. 0.22  
 Cap. Adj. factor due to Impeding mvmnt 0.22 1.00  
 Movement Capacity

---

Results for Two-stage process:

a  
 y  
 C t

---

#### Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)					610	
Movement Capacity (vph)					679	
Shared Lane Capacity (vph)						

---

# Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep					679	
Volume					610	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

## Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config							T	
v (vph)							610	
C(m) (vph)							679	
v/c							0.90	
95% queue length							11.41	
Control Delay							39.1	
LOS							E	
Approach Delay							39.1	
Approach LOS							E	

## Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

## TWO-WAY STOP CONTROL SUMMARY

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date Performed: 2/17/2004  
 Analysis Time Period: AM Peak  
 Intersection: I-95 NB Off Ramp  
 Jurisdiction: Mercer County  
 Units: U. S. Customary  
 Analysis Year: 2003 Existing  
 Project ID: Scudder Falls  
 East/West Street: NJ 29  
 North/South Street: off ramp  
 Intersection Orientation: EW

Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Eastbound				Westbound	
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume						206	
Peak-Hour Factor, PHF						0.92	
Hourly Flow Rate, HFR						223	
Percent Heavy Vehicles		--	--			--	--
Median Type/Storage		Undivided		/			
RT Channelized?						1	
Lanes						T	
Configuration						No	
Upstream Signal?		No					
Minor Street:	Approach	Northbound				Southbound	
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume						562	
Peak Hour Factor, PHF						0.92	
Hourly Flow Rate, HFR						610	
Percent Heavy Vehicles						0	
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage					/		/
Lanes						1	
Configuration						T	

Delay, Queue Length, and Level of Service							
Approach	EB	WB	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Config							T
v (vph)							610
C(m) (vph)							679
v/c							0.90
95% queue length							11.41
Control Delay							39.1
LOS							E
Approach Delay							39.1
Approach LOS							E

## HCS+: Unsignalized Intersections Release 5.21

Phone:  
E-Mail:

Fax:

---

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

---

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date Performed: 2/17/2004  
 Analysis Time Period: AM Peak  
 Intersection: I-95 NB Off Ramp  
 Jurisdiction: Mercer County  
 Units: U. S. Customary  
 Analysis Year: 2003 Existing  
 Project ID: Scudder Falls  
 East/West Street: NJ 29  
 North/South Street: off ramp  
 Intersection Orientation: EW

Study period (hrs): 0.25

---

Vehicle Volumes and Adjustments

---

Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R
Volume					206	
Peak-Hour Factor, PHF					0.92	
Peak-15 Minute Volume					56	
Hourly Flow Rate, HFR					223	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes					1	
Configuration					T	
Upstream Signal?		No			No	

Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume					562	
Peak Hour Factor, PHF					0.92	
Peak-15 Minute Volume					153	
Hourly Flow Rate, HFR					610	
Percent Heavy Vehicles					0	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?						
Lanes					1	
Configuration					T	

---

Pedestrian Volumes and Adjustments

---

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0

---

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

# Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

# Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)							6.5	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)							0	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)							0.00	
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage							6.5	
2-stage								

Follow-Up Time Calculations								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)							4.00	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)							0	
t(f)							4.0	

# Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				

Total Saturation Flow Rate, s (vph)  
 Arrival Type  
 Effective Green, g (sec)  
 Cycle Length, C (sec)  
 Rp (from Exhibit 16-11)  
 Proportion vehicles arriving on green P  
 g(q1)  
 g(q2)  
 g(q)

---

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

---

alpha  
 beta  
 Travel time, t(a) (sec)  
 Smoothing Factor, F  
 Proportion of conflicting flow, f  
 Max platooned flow, V(c,max)  
 Min platooned flow, V(c,min)  
 Duration of blocked period, t(p)  
 Proportion time blocked, p

	0.000	0.000
--	-------	-------

---

Computation 3-Platoon Event Periods      Result

---

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

---

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
---	--------------------------------	-------------------------------------	--------------------------------------

---

p(1)  
 p(4)  
 p(7)  
 p(8)  
 p(9)  
 p(10)  
 p(11)  
 p(12)

---

Computation 4 and 5  
 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

---

V c, x	223
s	
Px	
V c, u, x	

---

C r, x  
 C plat, x

---

Two-Stage Process	7	8	10	11
-------------------	---	---	----	----

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s								0
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

#### Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		223
Potential Capacity		679
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		679
Probability of Queue free St.	1.00	0.10
Step 4: LT from Minor St.	7	10
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.10	
Maj. L, Min T Adj. Imp Factor.	0.22	
Cap. Adj. factor due to Impeding mvmnt	0.22	1.00
Movement Capacity		

#### Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor  
 Cap. Adj. factor due to Impeding mvmnt  
 Movement Capacity

Part 3 - Single Stage  
 Conflicting Flows 223  
 Potential Capacity 679  
 Pedestrian Impedance Factor 1.00 1.00  
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00  
 Movement Capacity 679

Result for 2 stage process:

a  
 y  
 C t 679  
 Probability of Queue free St. 1.00 0.10

Step 4: LT from Minor St. 7 10

Part 1 - First Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor  
 Cap. Adj. factor due to Impeding mvmnt  
 Movement Capacity

Part 2 - Second Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor  
 Cap. Adj. factor due to Impeding mvmnt  
 Movement Capacity

Part 3 - Single Stage  
 Conflicting Flows  
 Potential Capacity  
 Pedestrian Impedance Factor 1.00 1.00  
 Maj. L, Min T Impedance factor 0.10  
 Maj. L, Min T Adj. Imp Factor. 0.22  
 Cap. Adj. factor due to Impeding mvmnt 0.22 1.00  
 Movement Capacity

Results for Two-stage process:

a  
 y  
 C t

#### Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
----------	--------	--------	--------	---------	---------	---------

Volume (vph)	610					
Movement Capacity (vph)	679					
Shared Lane Capacity (vph)						



## Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep					679	
Volume					610	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

## Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config							T	
v (vph)							610	
C(m) (vph)							679	
v/c							0.90	
95% queue length							11.41	
Control Delay							39.1	
LOS							E	
Approach Delay							39.1	
Approach LOS							E	

## Worksheet 11-Shared Major LT Impedance and Delay

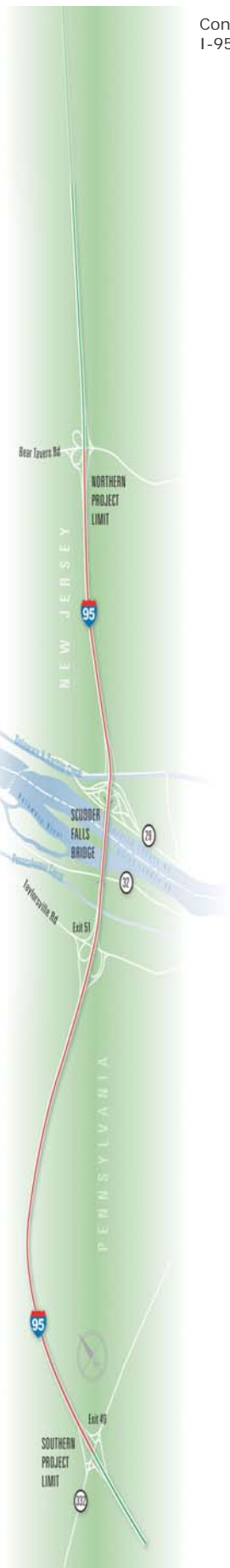
	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

## Technical Memorandum No. 28 – Point of Access Study



Contract C-393A, Capital Project No. CP0301A, Account No. 7161-06-012  
I-95/Scudder Falls Bridge Improvement Project

### I-95 Mainline Analysis 2003 Existing PM Peak



Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	2265	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	615	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1268	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	1268	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	1594	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	433	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	892	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	892	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

#### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

#### Flow Inputs and Adjustments

Volume, V	1570	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	427	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	879	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

#### LOS and Performance Measures

Flow rate, vp	879	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.



Phone:  
E-mail:

Fax:

#### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

#### Flow Inputs and Adjustments

Volume, V	1419	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	386	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	545	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

#### LOS and Performance Measures

Flow rate, vp	545	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

#### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

#### Flow Inputs and Adjustments

Volume, V	1745	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	474	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	651	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

#### LOS and Performance Measures

Flow rate, vp	651	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

#### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

#### Flow Inputs and Adjustments

Volume, V	3605	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	980	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1345	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

#### LOS and Performance Measures

Flow rate, vp	1345	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Free-flow speed, FFS	70.0	mi/h

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	4074	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1107	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1520	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	1520	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.7	mi/h

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone:  
E-mail:

Fax:

#### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

#### Flow Inputs and Adjustments

Volume, V	4183	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1137	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2342	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

#### LOS and Performance Measures

Flow rate, vp	2342	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.5	mi/h

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

#### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

#### Flow Inputs and Adjustments

Volume, V	3402	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	924	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1904	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

#### LOS and Performance Measures

Flow rate, vp	1904	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.8	mi/h

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

#### Operational Analysis

Analyst: Jason Wiggins  
Agency or Company: DMJM+HARRIS  
Date Performed: 2/12/2004  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

#### Flow Inputs and Adjustments

Volume, V	3523	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	957	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1972	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

#### LOS and Performance Measures

Flow rate, vp	1972	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	61.8	mi/h

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2265	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	1178	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	507	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2265	1178	507	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	615	320	138	v
Trucks and buses	6	7	4	%
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	

Heavy vehicle adjustment, fHV	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2536	1325	562	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) \frac{P}{FD} = 2536 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{Fi}$	2536	4700	No
$v_{12}$	2536	4400	No
$v_{FO} = v_F - v_R$	1211	4700	No
$v_R$	1325	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 18.4 \text{ pc/mi/ln}$   
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$D = 0.547$	
	$S$	
Space mean speed in ramp influence area,	$S = 52.4$	mph
	$R$	
Space mean speed in outer lanes,	$S = N/A$	mph
	$O$	
Space mean speed for all vehicles,	$S = 52.4$	mph



Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1087	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	507	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1178	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1087	507	1178	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	295	138	320	v
Trucks and buses	6	4	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1217	562	1325	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 1217$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	1779	4700	No
$v_{R12}$	1779	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 10.5$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$M = 0.248$	
	S	
Space mean speed in ramp influence area,	$S = 59.3$	mph
	R	
Space mean speed in outer lanes,	$S = N/A$	mph
	0	
Space mean speed for all vehicles,	$S = 59.3$	mph

Phone: Fax:  
E-mail:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3402	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	1135	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1256	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3402	1135	1256	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	924	308	341	v
Trucks and buses	6	7	6	%
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	

Heavy vehicle adjustment, fHV	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3809	1277	1406	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 3809$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3809	4700	No
$v_{12}$	3809	4400	No
$v_{FO} = v_F - v_R$	2532	4700	No
$v_R$	1277	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 29.4$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence D

#### Speed Estimation

Intermediate speed variable,	$D = 0.543$	
	$S$	
Space mean speed in ramp influence area,	$S = 52.5$	mph
	$R$	
Space mean speed in outer lanes,	$S = N/A$	mph
	$O$	
Space mean speed for all vehicles,	$S = 52.5$	mph

Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2267	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	1256	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1135	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2267	1256	1135	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	616	341	308	v
Trucks and buses	6	6	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2538	1406	1277	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 2538$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3944	4700	No
$v_{R12}$	3944	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.0$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	$M = 0.426$	
	S	
Space mean speed in ramp influence area,	$S = 55.2$	mph
	R	
Space mean speed in outer lanes,	$S = N/A$	mph
	0	
Space mean speed for all vehicles,	$S = 55.2$	mph

Phone: Fax:  
E-mail:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1594	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	308	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	166	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1594	308	166	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	433	84	45	v
Trucks and buses	6	5	6	%
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	

Heavy vehicle adjustment, fHV	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1785	343	186	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1785 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1785	4700	No
$v_{12}$	1785	4400	No
$v_{FO} = v_F - v_R$	1442	4700	No
$v_R$	343	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 12.0 \text{ pc/mi/ln}$   
 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,	$S_R = 54.4$	mph
Space mean speed in outer lanes,	$S_O = N/A$	mph
Space mean speed for all vehicles,	$S = 54.4$	mph



Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1286	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	166	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	308	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1286	166	308	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	349	45	84	v
Trucks and buses	6	6	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1440	186	343	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 1440$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	1626	4700	No
$v_{R12}$	1626	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.2$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$M = 0.309$	
	S	
Space mean speed in ramp influence area,	$S = 57.9$	mph
	R	
Space mean speed in outer lanes,	$S = N/A$	mph
	0	
Space mean speed for all vehicles,	$S = 57.9$	mph

Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Taylorsville W  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1452	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	118	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	166	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)	1452	118	166	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	395	32	45	v
Trucks and buses	6	4	6	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1626	131	186	pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)  
EQ  
P = 1.000 Using Equation 0  
FM  
 $v_{12} = v_F (P_{FM}) = 1626 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	1757	4700	No
v <sub>R12</sub>	1757	4600	No

Level of Service Determination (if not F)

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 17.4 \text{ pc/mi/ln}$   
Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M = 0.324	
	S	
Space mean speed in ramp influence area,	S = 57.5	mph
	R	
Space mean speed in outer lanes,	S = N/A	mph
	0	
Space mean speed for all vehicles,	S = 57.5	mph

Phone: Fax:  
E-mail:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville W  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4183	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	584	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	442	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	790	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4183	584	442	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1137	159	120	v
Trucks and buses	6	4	7	%
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	

Heavy vehicle adjustment, fHV	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4683	647	497	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 4683$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{Fi}$	4683	4700	No
$v_{12}$	4683	4400	Yes
$v_{FO} = v_F - v_R$	4036	4700	No
$v_R$	647	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 39.6$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence F

#### Speed Estimation

Intermediate speed variable,	$D = 0.486$	
	$S$	
Space mean speed in ramp influence area,	$S = 53.8$	mph
	$R$	
Space mean speed in outer lanes,	$S = N/A$	mph
	$O$	
Space mean speed for all vehicles,	$S = 53.8$	mph

Phone: Fax:  
E-mail:

# Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

# Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3599	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	442	vph
Length of first accel/decel lane	100	ft
Length of second accel/decel lane		ft

# Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	245	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1400	ft

# Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3599	442	245	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	978	120	67	v
Trucks and buses	6	7	3	%
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	

Heavy vehicle adjustment, fHV	0.971	0.966	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4029	497	270	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 4029$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4029	4700	No
$v_{12}$	4029	4400	No
$v_{FO} = v_F - v_R$	3532	4700	No
$v_R$	497	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 38.0$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence E

#### Speed Estimation

Intermediate speed variable,	$D = 0.473$	
Space mean speed in ramp influence area,	$S_R = 54.1$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 54.1$	mph



Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3157	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	245	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	442	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3157	245	442	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	858	67	120	v
Trucks and buses	6	3	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3534	270	497	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FM$   
 $v_{12} = v_F (P_{FM}) = 3534 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	3804	4700	No
$v_{R12}$	3804	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.1 \text{ pc/mi/ln}$   
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	$M = 0.407$	
	$S$	
Space mean speed in ramp influence area,	$S = 55.6$	mph
	$R$	
Space mean speed in outer lanes,	$S = N/A$	mph
	$O$	
Space mean speed for all vehicles,	$S = 55.6$	mph

Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1216	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	62	vph
Length of first accel/decel lane	1700	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	354	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1216	62	354	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	330	17	96	v
Trucks and buses	6	4	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1361	69	394	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FM$   
 $v_{12} = v_F (P_{FM}) = 1361 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	1430	4800	No
$v_{R12}$	1430	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 5.9 \text{ pc/mi/ln}$   
 Level of service for ramp-freeway junction areas of influence A

#### Speed Estimation

Intermediate speed variable,	$M = 0.218$	
	$S$	
Space mean speed in ramp influence area,	$S = 63.9$	mph
	$R$	
Space mean speed in outer lanes,	$S = N/A$	mph
	$O$	
Space mean speed for all vehicles,	$S = 63.9$	mph

Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Upper River Rd  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1278	vph

---

On Ramp Data

---

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	141	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	62	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1640	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1278	141	62	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	347	38	17	v
Trucks and buses	6	12	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.943	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1431	162	69	pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)  
EQ  
P = 1.000 Using Equation 0  
FM  
 $v_{12} = v_F (P_{FM}) = 1431 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	1593	4800	No
v <sub>R12</sub>	1593	4600	No

Level of Service Determination (if not F)

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 14.7 \text{ pc/mi/ln}$   
Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M = 0.305	
	S	
Space mean speed in ramp influence area,	S = 61.5	mph
	R	
Space mean speed in outer lanes,	S = N/A	mph
	0	
Space mean speed for all vehicles,	S = 61.5	mph

Phone: Fax:  
E-mail:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4074	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	252	vph
Length of first accel/decel lane	2000	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	361	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4074	252	361	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1107	68	98	v
Trucks and buses	6	11	4	%
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	

Heavy vehicle adjustment, fHV	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4561	289	400	pcph

# Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 4561$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4561	4800	No
$v_{12}$	4561	4400	Yes
$v_{FO} = v_F - v_R$	4272	4800	No
$v_R$	289	2000	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 25.5$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence F

# Speed Estimation

Intermediate speed variable,	$D = 0.454$	
Space mean speed in ramp influence area,	$S_R = 57.3$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 57.3$	mph



Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3822	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	361	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	252	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3822	361	252	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1039	98	68	v
Trucks and buses	6	4	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4279	400	289	pcph

# Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)  
EQ  
P = 1.000 Using Equation 0  
FM  
 $v_{12} = v_F (P_{FM}) = 4279 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	4679	4800	No
v <sub>R12</sub>	4679	4600	Yes

# Level of Service Determination (if not F)

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 39.7 \text{ pc/mi/ln}$   
Level of service for ramp-freeway junction areas of influence F

# Speed Estimation

Intermediate speed variable,	M = 0.717	
	S	
Space mean speed in ramp influence area,	S = 49.9	mph
	R	
Space mean speed in outer lanes,	S = N/A	mph
	0	
Space mean speed for all vehicles,	S = 49.9	mph

Phone: Fax:  
E-mail:

### Diverge Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1419	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	226	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	552	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1419	226	552	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	386	61	150	v
Trucks and buses	6	3	4	%
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	

Heavy vehicle adjustment, fHV	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1589	249	612	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 0.709$  Using Equation 5  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1199$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_F = v_{Fi}$	1589	7200	No
$v_{12}$	1199	4400	No
$v_{FO} = v_F - v_R$	1340	7200	No
$v_R$	249	2000	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 3.7$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence A

#### Speed Estimation

Intermediate speed variable,	$D = 0.450$	
Space mean speed in ramp influence area,	$S_R = 57.4$	mph
Space mean speed in outer lanes,	$S_O = 76.8$	mph
Space mean speed for all vehicles,	$S = 61.2$	mph

Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1193	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	552	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	226	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1193	552	226	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	324	150	61	v
Trucks and buses	6	4	3	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1336	612	249	pcph

#### Estimation of V12 Merge Areas

$L = 355.67$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 0.610$  Using Equation 1  
 FM  
 $v_{12} = v_F (P_{FM}) = 815$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	1948	7200	No
$v_{R12}$	1427	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 9.1$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence A

#### Speed Estimation

Intermediate speed variable,	$M = 0.257$	
	S	
Space mean speed in ramp influence area,	$S = 62.8$	mph
	R	
Space mean speed in outer lanes,	$S = 69.9$	mph
	O	
Space mean speed for all vehicles,	$S = 64.6$	mph

Phone: Fax:  
E-mail:

---

Merge Analysis

---

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date performed: 2/15/2004  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

---

Freeway Data

---

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3667	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	407	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

---

Adjacent Ramp Data (if one exists)

---

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	265	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

---

Conversion to pc/h Under Base Conditions

---

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3667	407	265	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	996	111	72	v
Trucks and buses	6	2	6	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	

Heavy vehicle adjustment, fHV	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4105	447	297	pcph

#### Estimation of V12 Merge Areas

$L = 936.46$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 0.580$  Using Equation 2  
 FM  
 $v_{12} = v_F (P_{FM}) = 2380$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{FO}$	4552	7200	No
$v_{R12}$	2827	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 19.8$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$M = 0.303$	
	S	
Space mean speed in ramp influence area,	$S = 61.5$	mph
	R	
Space mean speed in outer lanes,	$S = 65.6$	mph
	O	
Space mean speed for all vehicles,	$S = 63.0$	mph



Phone: Fax:  
E-mail:

### Operational Analysis

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date Performed: 2/16/2004  
Analysis Time Period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2003 Existing  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	304	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.15	
Weaving ratio, R	0.45	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	3340	0	265	327	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	908	0	72	89	v
Trucks and buses	6	10	6	4	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.971	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3739	0	296	362	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	1.87	0.75

unconstrained operation, Nw (Exhibit 24-7)	0.79
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	46.61	mph
Weaving segment density, D	23.58	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	7005	pc/h
Capacity as a 15-minute flow rate, c	6801	pc/h
Capacity as a full-hour volume, ch	6257	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	658	2800	a
Average flow rate (pcphpl)	1099	2400	b
Volume ratio, VR	0.15	0.35	c
Weaving ratio, R	0.45	N/A	d
Weaving length (ft)	304	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## TWO-WAY STOP CONTROL SUMMARY

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date Performed: 2/17/2004  
 Analysis Time Period: PM Peak  
 Intersection: I-95 SB Off Ramp  
 Jurisdiction: Mercer County  
 Units: U. S. Customary  
 Analysis Year: 2003 Existing  
 Project ID: Scudder Falls  
 East/West Street: NJ 29  
 North/South Street: off ramp  
 Intersection Orientation: EW

Study period (hrs): 0.25

## Vehicle Volumes and Adjustments

Major Street:	Approach	Eastbound				Westbound			
	Movement	1	2	3	4	5	6		
		L	T	R	L	T	R		
Volume						133			
Peak-Hour Factor, PHF						0.92			
Hourly Flow Rate, HFR						144			
Percent Heavy Vehicles		--	--			--	--		
Median Type/Storage		Undivided			/				
RT Channelized?									
Lanes						1			
Configuration						T			
Upstream Signal?			No			No			

Minor Street:	Approach	Northbound				Southbound			
	Movement	7	8	9	10	11	12		
		L	T	R	L	T	R		
Volume						112			
Peak Hour Factor, PHF						0.92			
Hourly Flow Rate, HFR						121			
Percent Heavy Vehicles						0			
Percent Grade (%)		0				0			
Flared Approach: Exists?/Storage					/		/		
Lanes						1			
Configuration						T			

## Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound				Southbound			
Movement	1	4	7	8	9	10	11	12		
Lane Config							T			

v (vph)	121
C(m) (vph)	751
v/c	0.16
95% queue length	0.57
Control Delay	10.7
LOS	B
Approach Delay	10.7
Approach LOS	B

Phone:  
E-Mail:

Fax:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Jason Wiggins  
Agency/Co.: DMJM+HARRIS  
Date Performed: 2/17/2004  
Analysis Time Period: PM Peak  
Intersection: I-95 SB Off Ramp  
Jurisdiction: Mercer County  
Units: U. S. Customary  
Analysis Year: 2003 Existing  
Project ID: Scudder Falls  
East/West Street: NJ 29  
North/South Street: off ramp  
Intersection Orientation: EW

Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R
Volume					133	
Peak-Hour Factor, PHF					0.92	
Peak-15 Minute Volume					36	
Hourly Flow Rate, HFR					144	
Percent Heavy Vehicles	--	--	--	--	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes					1	
Configuration					T	
Upstream Signal?		No			No	
Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume					112	
Peak Hour Factor, PHF					0.92	
Peak-15 Minute Volume					30	
Hourly Flow Rate, HFR					121	
Percent Heavy Vehicles					0	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?						
Lanes					1	
Configuration					T	

Pedestrian Volumes and Adjustments

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn Through							
S5 Left-Turn Through							

#### Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

#### Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)							6.5	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)							0	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)							0.00	
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage							6.5	
2-stage								

Follow-Up Time Calculations								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)							4.00	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)							0	
t(f)							4.0	

#### Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal					
	Movement 2		Movement 5		
	V(t)	V(l prot)	V(t)	V(l prot)	

Total Saturation Flow Rate, s (vph)  
 Arrival Type  
 Effective Green, g (sec)  
 Cycle Length, C (sec)  
 Rp (from Exhibit 16-11)  
 Proportion vehicles arriving on green P  
 g(q1)  
 g(q2)  
 g(q)

---

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

---

alpha  
 beta  
 Travel time, t(a) (sec)  
 Smoothing Factor, F  
 Proportion of conflicting flow, f  
 Max platooned flow, V(c,max)  
 Min platooned flow, V(c,min)  
 Duration of blocked period, t(p)  
 Proportion time blocked, p

	0.000	0.000
--	-------	-------

---

Computation 3-Platoon Event Periods      Result

---

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

---

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Stage II
---	--------------------------------	-------------------------------------	-----------------

---

p(1)  
 p(4)  
 p(7)  
 p(8)  
 p(9)  
 p(10)  
 p(11)  
 p(12)

---

Computation 4 and 5  
 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

---

V c, x	144
s	
Px	
V c, u, x	

---

C r, x  
 C plat, x

Stage1 Stage2 Stage1 Stage2 Stage1 Stage2 Stage1 Stage2

V(c,x)  
s  
P(x)  
V(c,u,x)

0

C(r,x)  
C(plat,x)

# Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St. 9 12

Conflicting Flows  
Potential Capacity  
Pedestrian Impedance Factor 1.00 1.00  
Movement Capacity  
Probability of Queue free St. 1.00 1.00

Step 2: LT from Major St. 4 1

Conflicting Flows  
Potential Capacity  
Pedestrian Impedance Factor 1.00 1.00  
Movement Capacity  
Probability of Queue free St. 1.00 1.00  
Maj L-Shared Prob Q free St.

Step 3: TH from Minor St. 8 11

Conflicting Flows 144  
Potential Capacity 751  
Pedestrian Impedance Factor 1.00 1.00  
Cap. Adj. factor due to Impeding mvmnt 1.00 1.00  
Movement Capacity 751  
Probability of Queue free St. 1.00 0.84

Step 4: LT from Minor St. 7 10

Conflicting Flows  
Potential Capacity  
Pedestrian Impedance Factor 1.00 1.00  
Maj. L, Min T Impedance factor 0.84  
Maj. L, Min T Adj. Imp Factor. 0.88  
Cap. Adj. factor due to Impeding mvmnt 0.88 1.00  
Movement Capacity

# Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St. 8 11

Part 1 - First Stage  
Conflicting Flows  
Potential Capacity  
Pedestrian Impedance Factor  
Cap. Adj. factor due to Impeding mvmnt

---

Part 2 - Second Stage

Conflicting Flows

Potential Capacity

Pedestrian Impedance Factor

Cap. Adj. factor due to Impeding mvmnt

Movement Capacity

---

Part 3 - Single Stage

Conflicting Flows		144
Potential Capacity		751
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		751

---

Result for 2 stage process:

a

y

C t

Probability of Queue free St.	1.00	0.84
-------------------------------	------	------

---

Step 4: LT from Minor St.	7	10
---------------------------	---	----

---

Part 1 - First Stage

Conflicting Flows

Potential Capacity

Pedestrian Impedance Factor

Cap. Adj. factor due to Impeding mvmnt

Movement Capacity

---

Part 2 - Second Stage

Conflicting Flows

Potential Capacity

Pedestrian Impedance Factor

Cap. Adj. factor due to Impeding mvmnt

Movement Capacity

---

Part 3 - Single Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.84	
Maj. L, Min T Adj. Imp Factor.	0.88	
Cap. Adj. factor due to Impeding mvmnt	0.88	1.00
Movement Capacity		

---

Results for Two-stage process:

a

y

C t

---

#### Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R

---

Volume (vph)					121	
Movement Capacity (vph)					751	



## Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep					751	
Volume					121	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

## Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config							T	
v (vph)							121	
C(m) (vph)							751	
v/c							0.16	
95% queue length							0.57	
Control Delay							10.7	
LOS							B	
Approach Delay							10.7	
Approach LOS							B	

## Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

## TWO-WAY STOP CONTROL SUMMARY

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date Performed: 2/17/2004  
 Analysis Time Period: PM Peak  
 Intersection: I-95 NB Off Ramp  
 Jurisdiction: Mercer County  
 Units: U. S. Customary  
 Analysis Year: 2003 Existing  
 Project ID: Scudder Falls  
 East/West Street: NJ 29  
 North/South Street: off ramp  
 Intersection Orientation: EW

Study period (hrs): 0.25

## Vehicle Volumes and Adjustments

Major Street:	Approach	Eastbound				Westbound		
	Movement	1	2	3	4	5	6	
		L	T	R	L	T	R	
Volume						230		
Peak-Hour Factor, PHF						0.92		
Hourly Flow Rate, HFR						249		
Percent Heavy Vehicles		--	--			--	--	
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes						1		
Configuration						T		
Upstream Signal?		No				No		

Minor Street:	Approach	Northbound				Southbound		
	Movement	7	8	9	10	11	12	
		L	T	R	L	T	R	
Volume						221		
Peak Hour Factor, PHF						0.92		
Hourly Flow Rate, HFR						240		
Percent Heavy Vehicles						0		
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage					/		/	
Lanes						1		
Configuration						T		

## Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound				Southbound		
Movement	1	4	7	8	9	10	11	12	
Lane Config							T		

v (vph)	240
C(m) (vph)	657
v/c	0.37
95% queue length	1.67
Control Delay	13.6
LOS	B
Approach Delay	13.6

Phone:  
E-Mail:

Fax:

---

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

---

Analyst: Jason Wiggins  
 Agency/Co.: DMJM+HARRIS  
 Date Performed: 2/17/2004  
 Analysis Time Period: PM Peak  
 Intersection: I-95 NB Off Ramp  
 Jurisdiction: Mercer County  
 Units: U. S. Customary  
 Analysis Year: 2003 Existing  
 Project ID: Scudder Falls  
 East/West Street: NJ 29  
 North/South Street: off ramp  
 Intersection Orientation: EW

Study period (hrs): 0.25

---

Vehicle Volumes and Adjustments

---

Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R
Volume					230	
Peak-Hour Factor, PHF					0.92	
Peak-15 Minute Volume					62	
Hourly Flow Rate, HFR					249	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes					1	
Configuration					T	
Upstream Signal?		No			No	
Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume					221	
Peak Hour Factor, PHF					0.92	
Peak-15 Minute Volume					60	
Hourly Flow Rate, HFR					240	
Percent Heavy Vehicles					0	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?						
Lanes					1	
Configuration					T	

---

Pedestrian Volumes and Adjustments

---

Movements 13 14 15 16

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn Through							
S5 Left-Turn Through							

#### Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

#### Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)							6.5	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)							0	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)							0.00	
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage							6.5	
2-stage								

Follow-Up Time Calculations								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)							4.00	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)							0	
t(f)							4.0	

#### Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal					
	Movement 2		Movement 5		
	V(t)	V(l prot)	V(t)	V(l prot)	

Total Saturation Flow Rate, s (vph)  
 Arrival Type  
 Effective Green, g (sec)  
 Cycle Length, C (sec)  
 Rp (from Exhibit 16-11)  
 Proportion vehicles arriving on green P  
 g(q1)  
 g(q2)  
 g(q)

---

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

---

alpha  
 beta  
 Travel time, t(a) (sec)  
 Smoothing Factor, F  
 Proportion of conflicting flow, f  
 Max platooned flow, V(c,max)  
 Min platooned flow, V(c,min)  
 Duration of blocked period, t(p)  
 Proportion time blocked, p

	0.000	0.000
--	-------	-------

---

Computation 3-Platoon Event Periods      Result

---

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

---

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Stage II
---	--------------------------------	-------------------------------------	-----------------

---

p(1)  
 p(4)  
 p(7)  
 p(8)  
 p(9)  
 p(10)  
 p(11)  
 p(12)

---

Computation 4 and 5  
 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

---

V c,x	249
s	
Px	
V c,u,x	

---

C r,x  
 C plat,x

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
--	--------	--------	--------	--------	--------	--------	--------	--------

V(c,x)								
s								0
P(x)								
V(c,u,x)								

C(r,x)
C(plat,x)

# Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
---------------------------	---	----

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 2: LT from Major St.	4	1
---------------------------	---	---

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		

Step 3: TH from Minor St.	8	11
---------------------------	---	----

Conflicting Flows		249
Potential Capacity		657
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		657
Probability of Queue free St.	1.00	0.63

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.63	
Maj. L, Min T Adj. Imp Factor.	0.72	
Cap. Adj. factor due to Impeding mvmnt	0.72	1.00
Movement Capacity		

# Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
---------------------------	---	----

Part 1 - First Stage
Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt

Part 2 - Second Stage  
Conflicting Flows  
Potential Capacity  
Pedestrian Impedance Factor  
Cap. Adj. factor due to Impeding mvmnt  
Movement Capacity

Part 3 - Single Stage			
Conflicting Flows			249
Potential Capacity			657
Pedestrian Impedance Factor	1.00		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00		1.00
Movement Capacity			657

Result for 2 stage process:

a		
y		
C t		657
Probability of Queue free St.	1.00	0.63

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Part 1 - First Stage
Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt
Movement Capacity

Part 2 - Second Stage  
Conflicting Flows  
Potential Capacity  
Pedestrian Impedance Factor  
Cap. Adj. factor due to Impeding mvmnt  
Movement Capacity

Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.63	
Maj. L, Min T Adj. Imp Factor.	0.72	
Cap. Adj. factor due to Impeding mvmnt	0.72	1.00
Movement Capacity		

---

Results for Two-stage process:

a  
y  
C t

## Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R

Volume (vph)	240
Movement Capacity (vph)	657

## Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep					657	
Volume					240	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

## Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11 T	12
Lane Config								
v (vph)							240	
C(m) (vph)							657	
v/c							0.37	
95% queue length							1.67	
Control Delay							13.6	
LOS							B	
Approach Delay							13.6	
Approach LOS							B	

## Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed:  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3409	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	926	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1908	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1908	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.8	mi/h
Number of lanes, N	2	
Density, D	30.4	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3659	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	994	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2048	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2048	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.6	mi/h
Number of lanes, N	2	
Density, D	33.8	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5719	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1554	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	3201	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	3201	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS

F

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5449	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1481	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2093	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2093	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	62.9	mi/h
Number of lanes, N	3	
Density, D	33.3	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5209	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1415	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1944	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1944	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.9	mi/h
Number of lanes, N	3	
Density, D	29.5	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	3211	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	873	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1797	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1797	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.9	mi/h
Number of lanes, N	2	
Density, D	28.1	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2501	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	680	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1400	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1400	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	2521	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	685	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1411	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1411	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.7	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	2541	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	690	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	948	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	948	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.5	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2641	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	718	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	986	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	986	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	14.1	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3053	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	830	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1709	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1709	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	2	
Density, D	26.5	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2493	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	677	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1396	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1396	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2643	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	718	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1480	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1480	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.8	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 04/09/04  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2603	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	707	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1000	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1000	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	14.3	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2883	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	783	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1076	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1076	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.4	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3865	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1050	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2164	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2164	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	58.0	mi/h
Number of lanes, N	2	
Density, D	37.3	pc/mi/ln

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3845	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1045	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2152	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2152	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	58.3	mi/h
Number of lanes, N	2	
Density, D	36.9	pc/mi/ln

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	4895	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1330	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2740	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	2740	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS

F

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	4855	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1319	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1812	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1812	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.7	mi/h
Number of lanes, N	3	
Density, D	26.8	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4425	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1202	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1651	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1651	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.1	mi/h
Number of lanes, N	3	
Density, D	23.9	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3409	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	1150	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		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	On	
Distance to adjacent ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3409	1150	1120	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	926	312	304	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3817	1294	1242	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 3817 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3817	4700	No
$v_{FO} = v_F - v_R$	2523	4700	No
$v_R$	1294	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, $v_{12A} = 3817$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3817	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 29.4 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.544$	
Space mean speed in ramp influence area,	$S_R = 52.5$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.5$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3379	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	280	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1120	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3379	280	1120	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	918	76	304	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3783	310	1260	pcph

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

$L =$  (Equation 25-2 or 25-3)  
EQ  
 $P = 1.000$  Using Equation 0  
FM  
 $v_{12} = v_F (P_{FM}) = 3783$  pc/h

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

		Actual	Maximum	LOS F?
v		4093	4700	No
FO				
v	v	0	pc/h	(Equation 25-4 or 25-5)
3 or av34				
Is v	v	> 2700	pc/h?	No
3 or av34				
Is v	v	> 1.5 v	/2	No
3 or av34		12		
If yes, v		= 3783		(Equation 25-8)
12A				

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

	Actual	Max Desirable	Violation?
v	4093	4600	No
R12			

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 28.6$  pc/mi/ln  
Level of service for ramp-freeway junction areas of influence D

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

Intermediate speed variable,	M	= 0.458	
	S		
Space mean speed in ramp influence area,	S	= 54.5	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 54.5	mph

Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3659	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	310	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1220	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3659	310	1220	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	994	84	332	v
Trucks and buses	6	5	6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4096	345	1366	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

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

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 4096 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4096	4700	No
$v_{FO} = v_F - v_R$	3751	4700	No
$v_R$	345	2000	No
$v_3$ or $v_{av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_3$ or $v_{av34} > 2700$ pc/h?		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 4096$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4096	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 31.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.459$	
Space mean speed in ramp influence area,	$S_R = 54.4$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 54.4$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3349	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	1220	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	310	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3349	1220	310	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	910	332	84	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3749	1366	345	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3749 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5115	4700	Yes
v <sub>3 or av34</sub>		0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			No	
If yes, v <sub>12A</sub> = 3749			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5115	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 41.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.939	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 43.4	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 43.4	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Taylorsville W  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4569	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	1150	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1220	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)	4569	1150	1220	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1242	312	332	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5115	1275	1366	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 5115 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6390	4700	Yes
v <sub>3 or av34</sub>		0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			No	
If yes, v <sub>12A</sub> = 5115			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6390	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 53.0 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 2.626	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 4.6	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 4.6	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5719	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	760	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	200	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5719	760	200	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1554	207	54	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6403	847	222	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 6403 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		6403	4800	Yes
$v_{FO} = v_F - v_R$		5556	4800	Yes
$v_R$		847	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, $v_{12A} = 6403$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	6403	4400	Yes

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D}$		54.4 pc/mi/ln
Level of service for ramp-freeway junction areas of influence F			

#### Speed Estimation

Intermediate speed variable,	$D = 0.504$	
Space mean speed in ramp influence area,	$S_R = 55.9$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 55.9$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4959	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	200	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	760	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4959	200	760	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1348	54	207	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5552	222	847	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 5552 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		5774	4800	Yes
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v		= 5552	(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	5774	4600	Yes
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 47.3 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 1.541	
	S		
Space mean speed in ramp influence area,	S	= 26.8	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 26.8	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Upper River Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5159	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	290	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	200	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1640	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5159	290	200	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1402	79	54	v
Trucks and buses	6	12	4	%
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	0.971	0.943	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5776	334	222	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3417 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6110	7200	No
v <sub>3 or av34</sub>		2359 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 3417		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6110	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 31.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.452	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.3	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 63.1	mph
Space mean speed for all vehicles,	S	= 59.4	mph



Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5449	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	910	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	670	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5449	910	670	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1481	247	182	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6101	1004	743	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.561 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3865 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		6101	7200	No
$v_{FO} = v_F - v_R$		5097	7200	No
$v_R$		1004	2000	No
$v_{3 \text{ or } 4}$		2236 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } 4} > 2700 \text{ pc/h?}$			No	
Is $v_{3 \text{ or } 4} > 1.5 v_{12} / 2$			No	
If yes, $v_{12A} = 3865$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3865	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 26.6 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.518$	
Space mean speed in ramp influence area,	$S_R = 55.5$	mph
Space mean speed in outer lanes,	$S_0 = 72.0$	mph
Space mean speed for all vehicles,	$S = 60.6$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4529	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	670	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	910	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4529	670	910	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1231	182	247	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5071	743	1004	pcph

#### Estimation of V12 Merge Areas

$$L = 1183.00 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.610 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3092 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5814	7200	No
v <sub>3 or av34</sub>		1979 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 3092		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5814	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.8 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.421	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 58.2	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.7	mph
Space mean speed for all vehicles,	S	= 60.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/2011  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB on ramp from PA 322  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2259	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	1120	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1150	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2259	1120	1150	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	614	304	312	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2529	1260	1275	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2529 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3789	4700	No
v <sub>3 or av34</sub>		0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2529		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3789	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub>	= 0.434	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 55.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 55.0	mph

Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2501	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	720	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1430	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2501	720	1430	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	680	196	389	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2800	810	1601	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 2800 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2800	4700	No
$v_{FO} = v_F - v_R$	1990	4700	No
$v_R$	810	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, $v_{12A} = 2800$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2800	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 20.7 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.501$	
Space mean speed in ramp influence area,	$S_R = 53.5$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 53.5$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1781	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	1430	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	720	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1781	1430	720	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	484	389	196	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1994	1601	810	pcph

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

$L =$  (Equation 25-2 or 25-3)  
EQ  
 $P = 1.000$  Using Equation 0  
FM  
 $v_{12} = v_F (P_{FM}) = 1994$  pc/h

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

		Actual	Maximum	LOS F?
v		3595	4700	No
FO				
v	v	0	pc/h	(Equation 25-4 or 25-5)
3 or av34				
Is v	v	> 2700	pc/h?	No
3 or av34				
Is v	v	> 1.5 v	/2	No
3 or av34		12		
If yes, v		= 1994		(Equation 25-8)
12A				

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

	Actual	Max Desirable	Violation?
v	3595	4600	No
R12			

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.2$  pc/mi/ln  
Level of service for ramp-freeway junction areas of influence C

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

Intermediate speed variable,	M	= 0.367	
	S		
Space mean speed in ramp influence area,	S	= 56.6	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 56.6	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville W  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2521	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	240	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	200	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	790	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2521		240		200	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	685		65		54	v
Trucks and buses	6		4		7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2822	266	225	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 2822 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2822	4700	No
$v_{FO} = v_F - v_R$	2556	4700	No
$v_R$	266	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, $v_{12A} = 2822$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2822	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 23.6 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.452$	
Space mean speed in ramp influence area,	$S_R = 54.6$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 54.6$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2281	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	200	vph
Length of first accel/decel lane	100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	420	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2281	200	420	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	620	54	114	v
Trucks and buses	6	7	3	%
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	0.971	0.966	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2554	225	463	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

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

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2554 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{12}$	2554	4700	No
$v_{FO} = v_{FO} - v_R$	2329	4700	No
$v_R$	225	2000	No
$v_3$ or $v_{av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_3$ or $v_{av34} > 2700$ pc/h?		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2554$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2554	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 25.3$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence C			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.448$	
Space mean speed in ramp influence area,	$S_R = 54.7$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 54.7$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2081	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	420	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	200	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2081	420	200	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	565	114	54	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2330	463	225	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FM$   
 $v_{12} = v_F (P_{FM}) = 2330$  pc/h

#### Capacity Checks

$v_{FO}$  Actual 2793 Maximum 4700 LOS F? 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,  $v_{12A} = 2330$  (Equation 25-8)

#### Flow Entering Merge Influence Area

$v_{R12}$  Actual 2793 Max Desirable 4600 Violation? No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 19.1$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,  $M_S = 0.296$   
 Space mean speed in ramp influence area,  $S_R = 58.2$  mph  
 Space mean speed in outer lanes,  $S_0 = N/A$  mph  
 Space mean speed for all vehicles,  $S = 58.2$  mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2541	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	390	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	370	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2541	390	370	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	690	106	101	v
Trucks and buses	6	11	4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2845	447	410	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 0.668 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2050$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_F = v_{Fi}$	2845	7200	No
$v_F = v_F - v_R$	2398	7200	No
$v_R$	447	2000	No
$v_{3 \text{ or } av34}$	795 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, $v_{12A} = 2050$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2050	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 17.4$  pc/mi/ln

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.468$	
Space mean speed in ramp influence area,	$S_R = 56.9$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 61.3$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2151	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	370	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	390	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2151	370	390	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	585	101	106	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2408	410	447	pcph

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

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2408 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v		2818	4800	No
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v		= 2408	(Equation 25-8)	
12A				

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

	Actual	Max Desirable	Violation?
v	2818	4600	No
R12			

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

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

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

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

Intermediate speed variable,	M	= 0.363	
	S		
Space mean speed in ramp influence area,	S	= 59.8	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 59.8	mph

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.21	
Weaving ratio, R	0.24	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	2641	0	540	170	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	718	0	147	46	v
Trucks and buses	6	10	6	4	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.971	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2956	0	604	188	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.39	0.18
Weaving and non-weaving speeds, Si	58.13	65.82
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.22
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	64.03	mph
Weaving segment density, D	14.63	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	8889	pc/h
Capacity as a 15-minute flow rate, c	8630	pc/h
Capacity as a full-hour volume, ch	7940	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	792	2800	a
Average flow rate (pcphpl)	937	2400	b
Volume ratio, VR	0.21	0.35	c
Weaving ratio, R	0.24	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2811	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	270	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	540	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2811	270	540	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	764	73	147	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3147	296	605	pcph

#### Estimation of V12 Merge Areas

$$L = 699.13 \quad (\text{Equation 25-2 or 25-3})$$

EQ

$$P = 0.595 \quad \text{Using Equation 2}$$

FM

$$v_{12} = v_F(P_{FM}) = 1872 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	3443	7200	No
v <sub>3 or av34</sub>	1275 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?		No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub> = 1872		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3443	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 14.7 \quad \text{pc/mi/ln}$   
Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.271	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 62.4	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 67.2	mph
Space mean speed for all vehicles,	S	= 64.1	mph



Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3053	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	1250	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	600	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3053	1250	600	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	830	340	163	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3418	1406	665	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 3418 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		3418	4700	No
$v_{FO} = v_F - v_R$		2012	4700	No
$v_R$		1406	2000	No
$v_3$ or $av_{34}$		0 pc/h	(Equation 25-15 or 25-16)	
Is $v_3$ or $av_{34} > 2700 \text{ pc/h?}$			No	
Is $v_3$ or $av_{34} > 1.5 v_{12} / 2$			No	
If yes, $v_{12A} = 3418$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3418	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 26.0 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.555$	
Space mean speed in ramp influence area,	$S_R = 52.2$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.2$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2403	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	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	600	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2403	90	600	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	653	24	163	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2690	100	675	pcph

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

$L =$  (Equation 25-2 or 25-3)  
EQ  
 $P = 1.000$  Using Equation 0  
FM  
 $v_{12} = v_F (P_{FM}) = 2690$  pc/h

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

		Actual	Maximum	LOS F?
v		2790	4700	No
FO				
v	v	0	pc/h	(Equation 25-4 or 25-5)
3 or av34				
Is v	v	> 2700	pc/h?	No
3 or av34				
Is v	v	> 1.5 v	/2	No
3 or av34		12		
If yes, v		= 2690		(Equation 25-8)
12A				

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

	Actual	Max Desirable	Violation?
v	2790	4600	No
R12			

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.6$  pc/mi/ln  
Level of service for ramp-freeway junction areas of influence B

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

Intermediate speed variable,	M	= 0.288	
	S		
Space mean speed in ramp influence area,	S	= 58.4	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 58.4	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2493	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	390	vph
Length of first accel/decel lane	850	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	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2493	390	300	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	677	106	82	v
Trucks and buses	6	5	6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2791	435	336	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 2791 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2791	4700	No
$v_{FO} = v_F - v_R$	2356	4700	No
$v_R$	435	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, $v_{12A} = 2791$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2791	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 20.6 \text{ pc/mi/ln}$

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.467$	
Space mean speed in ramp influence area,	$S_R = 54.3$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 54.3$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2183	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	455	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	390	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2183	300	390	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	593	82	106	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2444	336	435	pcph

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

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2444 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v		2780	4700	No
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v			(Equation 25-8)	
12A				

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

	Actual	Max Desirable	Violation?
v	2780	4600	No
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.2 \quad \text{pc/mi/ln}$$

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

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

Intermediate speed variable,	M	= 0.352	
	S		
Space mean speed in ramp influence area,	S	= 56.9	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 56.9	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Taylorsville W  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2403	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	240	vph
Length of first accel/decel lane	275	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	910	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2403	240	300	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	653	65	82	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2690	266	336	pcph

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

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P_{FM}) = 2690 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v <sub>FO</sub>		2956	4700	No
v <sub>3 or av34</sub>	v	0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	v	> 2700 pc/h?	No	
Is v <sub>3 or av34</sub>	v	> 1.5 v <sub>12</sub> / 2	No	
If yes, v <sub>12A</sub>		= 2690	(Equation 25-8)	

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

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2956	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.7 \quad \text{pc/mi/ln}$$

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

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

Intermediate speed variable,	M	= 0.377	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 56.3	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 56.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2643	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	400	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	140	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2643	400	140	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	718	109	38	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2959	446	155	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

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

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2959 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{12}$	2959	4800	No
$v_{FO} = v_F - v_R$	2513	4800	No
$v_R$	446	2000	No
$v_3$ or $v_{av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_3$ or $v_{av34} > 2700$ pc/h?		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 2959$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2959	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 24.7$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence C			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.468$	
Space mean speed in ramp influence area,	$S_R = 56.9$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 56.9$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2243	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	140	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	400	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2243	140	400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	610	38	109	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2511	155	446	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P_{FM}) = 2511 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		2666	4800	No
v <sub>3 or av34</sub>	v	0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	v	> 2700 pc/h?	No	
Is v <sub>3 or av34</sub>	v	> 1.5 v <sub>12</sub> / 2	No	
If yes, v <sub>12A</sub>		= 2511	(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2666	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.1 \quad \text{pc/mi/ln}$$

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 <sub>R</sub>	= 60.4	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 60.4	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Upper River Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2383	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	220	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	140	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1640	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2383	220	140	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	648	60	38	v
Trucks and buses	6	12	4	%
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	0.971	0.943	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2668	253	155	pcph

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

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2668 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v		2921	4800	No
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34	12			
If yes, v	= 2668	(Equation 25-8)		
12A				

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

	Actual	Max Desirable	Violation?
v	2921	4600	No
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.0 \quad \text{pc/mi/ln}$$

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	= 60.0	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 60.0	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2603	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	370	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	650	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2603	370	650	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	707	101	177	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2914	408	721	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.668 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2083 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		2914	7200	No
$v_{FO} = v_F - v_R$		2506	7200	No
$v_R$		408	2000	No
$v_{3 \text{ or } 34}$	$v_{av34}$	831 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } 34} > 2700 \text{ pc/h?}$			No	
Is $v_{3 \text{ or } 34} > 1.5 v_{12} / 2$			No	
If yes, $v_{12A} = 2083$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2083	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 11.3 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.465$	
Space mean speed in ramp influence area,	$S_R = 57.0$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 61.5$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2223	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	650	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	370	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2223	650	370	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	604	177	101	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2489	721	408	pcph

#### Estimation of V12 Merge Areas

$$L = 625.74 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.610 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1518 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3210	7200	No
v <sub>3 or av34</sub>		971 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1518		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3210	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.277	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 62.2	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 68.3	mph
Space mean speed for all vehicles,	S	= 64.0	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/2011  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB on ramp from PA 322  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1793	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	600	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1150	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1793	600	1150	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	487	163	312	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2007	675	1275	pcph

#### Estimation of V12 Merge Areas

$L =$  (Equation 25-2 or 25-3)  
 EQ  
 $P = 1.000$  Using Equation 0  
 FM  
 $v_{12} = v_F (P_{FM}) = 2007$  pc/h

#### Capacity Checks

		Actual	Maximum	LOS F?
v		2682	4700	No
FO				
v	v	0	pc/h	(Equation 25-4 or 25-5)
3 or	av34			
Is v	v	> 2700	pc/h?	No
3 or	av34			
Is v	v	> 1.5 v	/2	No
3 or	av34	12		
If yes, v	= 2007			(Equation 25-8)
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	2682	4600	No
R12			

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 20.8$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	M	= 0.318	
	S		
Space mean speed in ramp influence area,	S	= 57.7	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 57.7	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3845	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	1350	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1370	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3845	1350	1370	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1045	367	372	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4305	1519	1534	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 4305 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4305	4700	No
$v_{FO} = v_F - v_R$	2786	4700	No
$v_R$	1519	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, $v_{12A} = 4305$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4305	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 33.6 \text{ pc/mi/ln}$

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.565$	
Space mean speed in ramp influence area,	$S_R = 52.0$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.0$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2495	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	1370	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1350	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2495	1370	1350	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	678	372	367	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2793	1534	1519	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2793 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4327	4700	No
v <sub>3 or av34</sub>		0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2793		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4327	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.520	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 53.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 53.0	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM`  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville W  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4895	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	750	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	610	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	790	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4895	750	610	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1330	204	166	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5480	832	686	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 5480 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5480	4700	Yes
$v_{FO} = v_F - v_R$	4648	4700	No
$v_R$	832	2000	No
$v_3 \text{ or } v_{av34}$	0 pc/h	(Equation 25-15 or 25-16)	
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, $v_{12A} = 5480$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	5480	4400	Yes

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 46.4 \text{ pc/mi/ln}$

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.503$	
Space mean speed in ramp influence area,	$S_R = 53.4$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 53.4$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to Taylorsville E  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4145	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	610	vph
Length of first accel/decel lane	100	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	310	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4145	610	310	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1126	166	84	v
Trucks and buses	6	7	3	%
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	0.971	0.966	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4641	686	342	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 4641$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4641	4700	No
$v_{FO} = v_F - v_R$	3955	4700	No
$v_R$	686	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, $v_{12A} = 4641$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4641	4400	Yes

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 43.3$  pc/mi/ln

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.490$	
Space mean speed in ramp influence area,	$S_R = 53.7$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 53.7$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3535	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	310	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	610	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3535	310	610	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	961	84	166	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3958	342	686	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

3958

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

4300

Maximum

4700

LOS F?

No

v

3 or

av34

0

pc/h

(Equation 25-4 or 25-5)

Is

v

3 or

av34

> 2700 pc/h?

No

Is

v

3 or

av34

> 1.5 v /2

No

12

12A

(Equation 25-8)

Flow Entering Merge Influence Area

v

R12

Actual

4300

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L

=

30.9

pc/mi/ln

R

R

12

A

Level of service for ramp-freeway junction areas of influence

D

Speed Estimation

Intermediate speed variable,

M

=

0.520

Space mean speed in ramp influence area,

S

=

53.0

mph

Space mean speed in outer lanes,

S

=

N/A

mph

Space mean speed for all vehicles,

S

=

53.0

mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4855	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	410	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	450	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4855	410	450	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1319	111	122	v
Trucks and buses	6	11	4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5435	470	499	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

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

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 5435 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		5435	4800	Yes
$v_{FO} = v_F - v_R$		4965	4800	Yes
$v_R$		470	2000	No
$v_3$ or $av_{34}$		0 pc/h	(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, $v_{12A} = 5435$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	5435	4400	Yes

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

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.470$	
Space mean speed in ramp influence area,	$S_R = 56.8$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 56.8$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4445	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	450	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	410	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4445	450	410	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1208	122	111	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4976	499	470	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 4976 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5475	4800	Yes
v <sub>3 or av34</sub>	v	0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	v	> 2700 pc/h?	No	
Is v <sub>3 or av34</sub>	v	> 1.5 v <sub>12</sub> / 2	No	
If yes, v <sub>12A</sub>		= 4976	(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5475	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 45.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 1.228	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 35.6	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 35.6	mph

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.15	
Weaving ratio, R	0.49	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	4425	0	400	380	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	1202	0	109	103	v
Trucks and buses	6	10	6	4	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.971	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4954	0	447	421	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.53	0.26
Weaving and non-weaving speeds, Si	54.11	62.65
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.04
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	61.21	mph
Weaving segment density, D	23.78	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	9195	pc/h
Capacity as a 15-minute flow rate, c	8927	pc/h
Capacity as a full-hour volume, ch	8213	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	868	2800	a
Average flow rate (pcphpl)	1455	2400	b
Volume ratio, VR	0.15	0.35	c
Weaving ratio, R	0.49	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 No-Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4405	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	450	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	400	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4405	450	400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1197	122	109	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4932	494	448	pcph

#### Estimation of V12 Merge Areas

$$L = 1123.50 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.568 \text{ Using Equation 2}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2801 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5426	7200	No
v <sub>3 or av34</sub>		2131 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			Yes	
If yes, v <sub>12A</sub> = 2818			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	5426	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.5 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.344	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 60.4	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.2	mph
Space mean speed for all vehicles,	S	= 61.8	mph



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3773	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1025	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2112	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2112	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.3	mi/h
Number of lanes, N	2	
Density, D	35.6	pc/mi/ln

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4083	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1110	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1524	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1524	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	23.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	6343	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1724	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1420	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1420	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	5	
Density, D	21.8	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5923	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1610	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1706	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1706	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.8	mi/h
Number of lanes, N	4	
Density, D	24.8	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5513	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1498	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2057	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2057	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	3	
Density, D	32.3	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3427	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	931	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1918	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1918	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.7	mi/h
Number of lanes, N	2	
Density, D	30.6	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2727	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	741	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1018	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1018	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	15.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	2797	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	760	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	783	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	783	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	4	
Density, D	12.0	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.



Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	2907	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	790	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1085	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1085	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.5	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2997	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	814	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1118	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1118	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.0	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3290	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	894	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1842	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1842	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.5	mi/h
Number of lanes, N	2	
Density, D	29.0	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2740	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	745	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1023	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1023	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	15.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2950	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	802	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	661	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	661	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	5	
Density, D	10.2	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2870	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	780	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	827	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	827	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	11.8	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3130	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	851	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1168	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1168	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	4237	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1151	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2372	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	2372	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS

F

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4257	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1157	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1589	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1589	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	3	
Density, D	24.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	5427	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1475	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1519	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1519	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	4	
Density, D	23.4	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

-----Operational Analysis-----

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

-----Flow Inputs and Adjustments-----

Volume, V	5247	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1426	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1958	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1958	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.6	mi/h
Number of lanes, N	3	
Density, D	29.8	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4787	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1301	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1786	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1786	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.0	mi/h
Number of lanes, N	3	
Density, D	26.3	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3773	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	1180	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1190	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3773	1180	1190	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1025	321	323	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4224	1327	1319	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

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

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 4224 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4224	4700	No
$v_{FO} = v_F - v_R$	2897	4700	No
$v_R$	1327	2000	No
$v_3$ or $v_{av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_3$ or $v_{av34} > 2700$ pc/h?		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 4224$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4224	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 32.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.547$	
Space mean speed in ramp influence area,	$S_R = 52.4$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.4$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3783	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	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1190	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3783	300	1190	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1028	82	323	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4235	333	1339	pcph

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

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 4235 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4568	4700	No
v <sub>3 or av34</sub>		0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 4235		(Equation 25-8)	

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

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4568	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 32.3 \quad \text{pc/mi/ln}$$

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

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

Intermediate speed variable,	M	= 0.601	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 51.2	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 51.2	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4083	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	310	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1330	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4083	310	1330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1110	84	361	v
Trucks and buses	6	5	6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4571	345	1489	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.630 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3007 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4571	7050	No
$v_{FO} = v_F - v_R$	4226	7050	No
$v_R$	345	2000	No
$v_{3 \text{ or } av34}$	1564 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, $v_{12A} = 3007$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3007	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 22.5 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.459$	
Space mean speed in ramp influence area,	$S_R = 54.4$	mph
Space mean speed in outer lanes,	$S_0 = 69.1$	mph
Space mean speed for all vehicles,	$S = 58.7$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl E ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3773	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	1330	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	310	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3773	1330	310	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1025	361	84	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4224	1489	345	pcph

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

$$L = 852.80 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.590 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 2493 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5713	7050	No
v <sub>3 or av34</sub>		1731 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2493		(Equation 25-8)	

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

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5713	4600	No

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

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

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

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

Intermediate speed variable,	M	= 0.498	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 53.5	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 60.6	mph
Space mean speed for all vehicles,	S	= 55.5	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl W ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5103	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	1240	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1330	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)	5103	1240	1330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1387	337	361	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5713	1375	1489	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.046 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 262 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		7088	9400	No
FO				
v	v	2725 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	Yes	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34		12		
If yes, v			(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	7088	4600	No
12A			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 31.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.453	
	S		
Space mean speed in ramp influence area,	S	= 54.6	mph
	R		
Space mean speed in outer lanes,	S	= 60.6	mph
	0		
Space mean speed for all vehicles,	S	= 57.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29 DROP LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6343	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	910	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	490	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6343	910	490	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1724	247	133	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7101	1014	543	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.436 \quad \text{Using Equation 8}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3668 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7101	9600	No
$v_{FO} = v_F - v_R$	6087	9600	No
$v_R$	1014	2000	No
$v_{3 \text{ or } av34}$	1716 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, $v_{12A} = 3668$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3668	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D}$	$= 30.8$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D = 0.519$	
Space mean speed in ramp influence area,	$S_R = 55.5$	mph
Space mean speed in outer lanes,	$S_0 = 74.0$	mph
Space mean speed for all vehicles,	$S = 63.1$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5433	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?	Yes	
Volume on adjacent Ramp	910	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5433	490	910	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1476	133	247	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6083	543	1014	pcph

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

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

$$EQ$$

$$P = 0.150 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 912 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v		6626	9600	No
FO				
v	v	2585 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34	12			
If yes, v	= 2433	(Equation 25-8)		
12A				

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

	Actual	Max Desirable	Violation?
v	6626	4600	No
12A			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.3 \quad \text{pc/mi/ln}$$

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

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

Intermediate speed variable,	M	= 0.362	
	S		
Space mean speed in ramp influence area,	S	= 59.9	mph
	R		
Space mean speed in outer lanes,	S	= 65.2	mph
	0		
Space mean speed for all vehicles,	S	= 62.7	mph

Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB OffRmp to Br Tvrn Rd DRP LN  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5923	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	1090	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	680	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5923	1090	680	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1610	296	185	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6631	1203	754	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.539 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 4128 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6631	7200	No
$v_{FO} = v_F - v_R$	5428	7200	No
$v_R$	1203	2000	No
$v_{3 \text{ or } av34}$	2503 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, $v_{12A} = 4128$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4128	4400	No

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

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

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.536$	
Space mean speed in ramp influence area,	$S_R = 55.0$	mph
Space mean speed in outer lanes,	$S_0 = 70.9$	mph
Space mean speed for all vehicles,	$S = 60.1$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4833	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	680	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1090	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4833	680	1090	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1313	185	296	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5411	754	1203	pcph

#### Estimation of V12 Merge Areas

$$L = 1258.11 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.610 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3299 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6165	7200	No
v <sub>3 or av34</sub>		2112 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 3299		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6165	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.5 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.465	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.2	mph
Space mean speed for all vehicles,	S	= 59.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 EB  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2593	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	1190	vph
Length of first accel/decel lane	1200	ft
Length of second accel/decel lane		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	Off	
Distance to adjacent Ramp	1300	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2593	1190	1180	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	705	323	321	v
Trucks and buses	6	6	3	%
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	0.971	0.971	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2903	1332	1302	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

2903

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

4235

0

pc/h

Maximum

4700

(Equation 25-4 or 25-5)

LOS F?

No

Is

v

3 or

av34

>

2700 pc/h?

No

Is

v

3 or

av34

>

1.5 v

/2

No

If yes, v

=

2903

(Equation 25-8)

12A

Flow Entering Merge Influence Area

v

R12

Actual

4235

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v

+ 0.0078 v

- 0.00627 L

=

30.4

pc/mi/ln

R

R

12

A

Level of service for ramp-freeway junction areas of influence

D

Speed Estimation

Intermediate speed variable,

M

=

0.506

Space mean speed in ramp influence area,

S

=

53.4

mph

Space mean speed in outer lanes,

S

=

N/A

mph

Space mean speed for all vehicles,

S

=

53.4

mph

Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332 DROP LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2727	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	760	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1460	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2727	760	1460	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	741	207	397	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3053	855	1635	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 0.644 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 2271 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3053	7050	No
$v_{FO} = v_F - v_R$	2198	7050	No
$v_R$	855	2000	No
$v_{3 \text{ or } av34}$	782 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, $v_{12A} = 2271$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2271	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 16.1 \text{ pc/mi/ln}$

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.505$	
Space mean speed in ramp influence area,	$S_R = 53.4$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 57.1$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1967	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	1460	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	720	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1967	1460	720	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	535	397	196	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2202	1635	810	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2202 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		3837	4700	No
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v			(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	3837	4600	No
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.0 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.406	
	S		
Space mean speed in ramp influence area,	S	= 55.7	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 55.7	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off rmp to Tylrsvllle DRP LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2797	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	490	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	420	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	790	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2797	490	420	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	760	133	114	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3131	543	472	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.657 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2243$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3131	7050	No
$v_{FO} = v_F - v_R$	2588	7050	No
$v_R$	543	2000	No
$v_{3 \text{ or } av34}$	888 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, $v_{12A} = 2243$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2243	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 18.6$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.477$	
Space mean speed in ramp influence area,	$S_R = 54.0$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 58.0$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2307	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	420	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	490	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2307	420	490	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	627	114	133	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2583	463	551	pcph

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

$$L = 641.70 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.613 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1583 \text{ pc/h}$$

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

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3046	7050	No
v <sub>3 or av34</sub>		1000 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1583		(Equation 25-8)	

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

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3046	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.3 \text{ pc/mi/ln}$$

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

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

Intermediate speed variable,	M	= 0.263	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 59.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 63.2	mph
Space mean speed for all vehicles,	S	= 60.3	mph

Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2907	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	520	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	410	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2907	520	410	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	790	141	111	v
Trucks and buses	6	11	4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3255	596	455	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 0.651 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2328 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3255	7200	No
$v_{FO} = v_F - v_R$	2659	7200	No
$v_R$	596	2000	No
$v_{3 \text{ or } av34}$	927 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, $v_{12A} = 2328$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2328	4400	No

# Level of Service Determination (if not F)

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

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.482$	
Space mean speed in ramp influence area,	$S_R = 56.5$	mph
Space mean speed in outer lanes,	$S_O = 76.8$	mph
Space mean speed for all vehicles,	$S = 61.1$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29 ADD LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2387	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	410	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	520	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2387	410	520	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	649	111	141	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2672	455	596	pcph

#### Estimation of V12 Merge Areas

$$L = 247.45 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.587 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1568 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3127	7200	No
v <sub>3 or av34</sub>		1104 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1568		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3127	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.327	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 60.8	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 67.8	mph
Space mean speed for all vehicles,	S	= 63.1	mph



Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.19	
Weaving ratio, R	0.26	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	3187	0	550	190	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	866	0	149	52	v
Trucks and buses	6	10	4	6	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.980	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3568	0	609	212	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.44	0.20
Weaving and non-weaving speeds, Si	56.78	64.82
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.15
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	63.14	mph
Weaving segment density, D	17.38	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9032	pc/h
Capacity as a 15-minute flow rate, c	8769	pc/h
Capacity as a full-hour volume, ch	8067	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	821	2800	a
Average flow rate (pcphpl)	1097	2400	b
Volume ratio, VR	0.19	0.35	c
Weaving ratio, R	0.26	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2637	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	270	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	550	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2637	270	550	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	717	73	149	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2952	296	616	pcph

#### Estimation of V12 Merge Areas

$$L = 657.40 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.597 \quad \text{Using Equation 2}$$

$$FM$$

$$v_{12} = v_F(P) = 1764 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	3248	7200	No
v <sub>3 or av34</sub>	1188 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?		No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub> = 1764		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3248	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.267	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 62.5	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 67.5	mph
Space mean speed for all vehicles,	S	= 64.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3290	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	1290	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	640	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	3290		1290		640	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	894		351		174	v
Trucks and buses	6		7		4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3683	1451	710	pcph

#### Estimation of V12 Diverge Areas

$L =$  (Equation 25-8 or 25-9)  
 $EQ$   
 $P = 1.000$  Using Equation 0  
 $FD$   
 $v_{12} = v_R + (v_F - v_R) P = 3683$  pc/h  
 $FD$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3683	4700	No
$v_{FO} = v_F - v_R$	2232	4700	No
$v_R$	1451	2000	No
$v_3$ or $v_{av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_3$ or $v_{av34} > 2700$ pc/h?		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 3683$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3683	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 28.3$  pc/mi/ln  
 Level of service for ramp-freeway junction areas of influence D

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.559$	
Space mean speed in ramp influence area,	$S_R = 52.2$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 52.2$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 ADD LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2640	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	100	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	640	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2640	100	640	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	717	27	174	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2956	111	720	pcph

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

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2956 \quad \text{pc/h}$$

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

		Actual	Maximum	LOS F?
v		3067	4700	No
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34	12			
If yes, v	= 2956	(Equation 25-8)		
12A				

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

	Actual	Max Desirable	Violation?
v	3067	4600	No
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 20.7 \quad \text{pc/mi/ln}$$

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

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

Intermediate speed variable,	M	= 0.309	
	S		
Space mean speed in ramp influence area,	S	= 57.9	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 57.9	mph



Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2740	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	390	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	330	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2740		390		330	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	745		106		90	v
Trucks and buses	6		5		6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3068	435	369	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 0.663 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2181 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3068	7050	No
$v_{FO} = v_F - v_R$	2633	7050	No
$v_R$	435	2000	No
$v_{3 \text{ or } av34}$	887 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, $v_{12A} = 2181$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2181	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 15.4 \text{ pc/mi/ln}$

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.467$	
Space mean speed in ramp influence area,	$S_R = 54.3$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 58.3$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl E ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2350	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	330	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	390	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2350	330	390	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	639	90	106	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2631	369	435	pcph

#### Estimation of V12 Merge Areas

$$L = 272.22 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.590 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1553 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3000	7050	No
v <sub>3 or av34</sub>		1078 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1553		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3000	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 17.4 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.316	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.7	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 62.9	mph
Space mean speed for all vehicles,	S	= 59.5	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl W ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2680	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	270	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	330	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)	2680	270	330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	728	73	90	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3000	299	369	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.180 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 541 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		3299	9400	No
FO				
v	v	1229 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34		12		
If yes, v		= 1200	(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	3299	4600	No
12A			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.3 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.319	
	S		
Space mean speed in ramp influence area,	S	= 57.7	mph
	R		
Space mean speed in outer lanes,	S	= 63.6	mph
	0		
Space mean speed for all vehicles,	S	= 60.7	mph

Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29 DROP LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2950	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	440	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	130	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2950	440	130	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	802	120	35	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3303	490	144	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 0.436 Using Equation 8

FD

$v_{12} = v_R + (v_F - v_R) P = 1716$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3303	9600	No
$v_{FO} = v_F - v_R$	2813	9600	No
$v_R$	490	2000	No
$v_{3 \text{ or } av34}$	793 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, $v_{12A} = 1716$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	1716	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 14.1$  pc/mi/ln

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.472$	
Space mean speed in ramp influence area,	$S_R = 56.8$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 64.9$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2510	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	360	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	440	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2510	360	440	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	682	98	120	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2810	399	490	pcph

#### Estimation of V12 Merge Areas

$$L = 336.93 \text{ (Equation 25-2 or 25-3)}$$

EQ

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

FM

$$v_{12} = v_F (P_{FM}) = 1662 \text{ pc/h}$$

12 F FM

#### Capacity Checks

		Actual	Maximum	LOS F?
v		3209	7200	No
FO				
v	v	1148 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v <sub>12</sub> / 2	No	
3 or av34				
If yes, v		= 1662	(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	3209	4600	No
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.2 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.317	
	S		
Space mean speed in ramp influence area,	S	= 61.1	mph
	R		
Space mean speed in outer lanes,	S	= 67.7	mph
	0		
Space mean speed for all vehicles,	S	= 63.3	mph

Phone:  
E-mail:

Fax:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB OffRmp to Br Tvrn Rd DRP LN  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2870	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	400	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	660	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2870	400	660	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	780	109	179	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3213	441	732	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.659 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2269$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3213	7200	No
$v_{FO} = v_F - v_R$	2772	7200	No
$v_R$	441	2000	No
$v_{3 \text{ or } av34}$	944 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, $v_{12A} = 2269$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2269	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 12.9$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.468$	
Space mean speed in ramp influence area,	$S_R = 56.9$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 61.6$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2470	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	660	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	400	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2470	660	400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	671	179	109	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2765	732	441	pcph

#### Estimation of V12 Merge Areas

$$L = 687.16 \quad (\text{Equation 25-2 or 25-3})$$

EQ

$$P = 0.610 \quad \text{Using Equation 1}$$

FM

$$v_{12} = v_F (P_{FM}) = 1686 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	3497	7200	No
v <sub>3 or av34</sub>	1079 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?		No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub> = 1686		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3497	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.284	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 62.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 67.9	mph
Space mean speed for all vehicles,	S	= 63.7	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 EB  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2000	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	640	vph
Length of first accel/decel lane	1200	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1290	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1300	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2000	640	1290	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	543	174	351	v
Trucks and buses	6	6	3	%
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	0.971	0.971	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2239	717	1423	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2239 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		2956	4700	No
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v			(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	2956	4600	No
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 20.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.312	
	S		
Space mean speed in ramp influence area,	S	= 57.8	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 57.8	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332 DROP LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4257	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	1420	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1400	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4257	1420	1400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1157	386	380	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4766	1597	1567	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 0.567 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 3395 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4766	7050	No
$v_{FO} = v_F - v_R$	3169	7050	No
$v_R$	1597	2000	No
$v_{3 \text{ or } av34}$	1371 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, $v_{12A} = 3395$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3395	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 25.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.572$	
Space mean speed in ramp influence area,	$S_R = 51.9$	mph
Space mean speed in outer lanes,	$S_0 = 69.9$	mph
Space mean speed for all vehicles,	$S = 56.0$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On rmp from PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2837	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	1400	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1420	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2837	1400	1420	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	771	380	386	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3176	1567	1597	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3176 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4743	4700	Yes
v <sub>3 or av34</sub>		0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			No	
If yes, v <sub>12A</sub> = 3176			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4743	4600	Yes

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 33.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.672	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 49.5	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 49.5	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Rmp to Tylrsvle DRP LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5427	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	1480	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	310	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	790	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5427	1480	310	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1475	402	84	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6076	1641	349	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.533 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 4003 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		6076	7050	No
$v_{FO} = v_F - v_R$		4435	7050	No
$v_R$		1641	2000	No
$v_{3 \text{ or } 34}$		2073 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } 34} > 2700 \text{ pc/h?}$			No	
Is $v_{3 \text{ or } 34} > 1.5 v_{12} / 2$			No	
If yes, $v_{12A} = 4003$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4003	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 33.7 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.576$	
Space mean speed in ramp influence area,	$S_R = 51.8$	mph
Space mean speed in outer lanes,	$S_0 = 67.1$	mph
Space mean speed for all vehicles,	$S = 56.1$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3947	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	310	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1480	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3947	310	1480	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1073	84	402	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4419	342	1665	pcph

#### Estimation of V12 Merge Areas

$$L = 1008.71 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.613 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2708 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4761	7050	No
v <sub>3 or av34</sub>		1711 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			No	
If yes, v <sub>12A</sub> = 2708			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4761	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.2 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.315	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.8	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 60.6	mph
Space mean speed for all vehicles,	S	= 58.8	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5247	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	420	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	600	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5247	420	600	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1426	114	163	v
Trucks and buses	6	11	4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5874	482	665	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.591 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3669$  pc/h

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		5874	7200	No
$v_{FO} = v_F - v_R$		5392	7200	No
$v_R$		482	2000	No
$v_{3 \text{ or } av34}$		2205 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, $v_{12A} = 3669$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3669	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 31.3$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.471$	
Space mean speed in ramp influence area,	$S_R = 56.8$	mph
Space mean speed in outer lanes,	$S_0 = 72.1$	mph
Space mean speed for all vehicles,	$S = 61.7$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29 ADD LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4827	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	600	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	420	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4827	600	420	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1312	163	114	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5404	665	482	pcph

#### Estimation of V12 Merge Areas

$$L = 877.04 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.587 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 3172 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6069	7200	No
v <sub>3 or av34</sub>		2232 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 3172		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6069	4600	No

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

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

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.478	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 56.6	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 63.8	mph
Space mean speed for all vehicles,	S	= 59.0	mph

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.15	
Weaving ratio, R	0.49	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	4787	0	420	410	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	1301	0	114	111	v
Trucks and buses	6	10	6	4	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.971	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5359	0	470	454	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.57	0.28
Weaving and non-weaving speeds, Si	53.15	61.72
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.04
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	60.29	mph
Weaving segment density, D	26.05	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	9204	pc/h
Capacity as a 15-minute flow rate, c	8936	pc/h
Capacity as a full-hour volume, ch	8221	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	924	2800	a
Average flow rate (pcphpl)	1570	2400	b
Volume ratio, VR	0.15	0.35	c
Weaving ratio, R	0.49	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4797	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	450	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	410	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4797	450	410	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1304	122	111	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5371	494	459	pcph

#### Estimation of V12 Merge Areas

$$L = 1217.44 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.562 \text{ Using Equation 2}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3019 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5865	7200	No
v <sub>3 or av34</sub>		2352 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			Yes	
If yes, v <sub>12A</sub> = 3069			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	5865	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.5 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.374	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 59.5	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 63.5	mph
Space mean speed for all vehicles,	S	= 61.0	mph



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3773	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1025	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2112	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2112	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.3	mi/h
Number of lanes, N	2	
Density, D	35.6	pc/mi/ln

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4083	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1110	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1524	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1524	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	23.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	6343	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1724	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1420	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1420	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	5	
Density, D	21.8	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5923	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1610	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1706	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1706	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.8	mi/h
Number of lanes, N	4	
Density, D	24.8	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5513	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1498	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2057	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2057	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	3	
Density, D	32.3	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3053	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	830	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1709	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1709	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	2	
Density, D	26.5	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2353	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	639	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	878	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	878	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	13.5	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2373	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	645	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	664	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	664	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	4	
Density, D	10.2	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.



Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	2553	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	694	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	953	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	953	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.6	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2678	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	728	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	999	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	999	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	14.3	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3309	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	899	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1852	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1852	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.4	mi/h
Number of lanes, N	2	
Density, D	29.2	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2740	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	745	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1023	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1023	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	15.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2950	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	802	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	661	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	661	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	5	
Density, D	10.2	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2870	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	780	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	827	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	827	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	11.8	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3130	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	851	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1168	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1168	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4056	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1102	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2270	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2270	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	41.3	pc/mi/ln

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4036	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1097	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1506	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1506	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	23.2	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5126	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1393	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1435	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1435	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	4	
Density, D	22.1	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5021	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1364	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1874	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1874	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	66.9	mi/h
Number of lanes, N	3	
Density, D	28.0	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4591	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1248	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1713	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1713	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.7	mi/h
Number of lanes, N	3	
Density, D	24.9	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3773	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	1180	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1190	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3773	1180	1190	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1025	321	323	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4224	1327	1319	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 4224$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4224	4700	No
$v_{FO} = v_F - v_R$	2897	4700	No
$v_R$	1327	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, $v_{12A} = 4224$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4224	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 32.9$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.547$	
Space mean speed in ramp influence area,	$S_R = 52.4$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.4$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 ADD LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3783	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	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1190	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3783	300	1190	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1028	82	323	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4235	333	1339	pcph

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

$L =$  (Equation 25-2 or 25-3)  
EQ  
 $P = 1.000$  Using Equation 0  
FM  
 $v_{12} = v_F (P_{FM}) = 4235$  pc/h

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

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4568	4700	No
v <sub>3 or av34</sub>	v	0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	v	> 2700 pc/h?	No	
Is v <sub>3 or av34</sub>	v	> 1.5 v <sub>12</sub> / 2	No	
If yes, v <sub>12A</sub>		= 4235	(Equation 25-8)	

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

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4568	4600	No

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

Density,  $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 32.3$  pc/mi/ln  
Level of service for ramp-freeway junction areas of influence D

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

Intermediate speed variable,	M	= 0.601	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 51.2	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 51.2	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4083	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	310	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1330	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4083	310	1330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1110	84	361	v
Trucks and buses	6	5	6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4571	345	1489	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.630 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3007 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4571	7050	No
$v_{FO} = v_F - v_R$	4226	7050	No
$v_R$	345	2000	No
$v_{3 \text{ or } av34}$	1564 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, $v_{12A} = 3007$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3007	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 22.5 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.459$	
Space mean speed in ramp influence area,	$S_R = 54.4$	mph
Space mean speed in outer lanes,	$S_0 = 69.1$	mph
Space mean speed for all vehicles,	$S = 58.7$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl E ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3773	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	1330	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	310	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3773	1330	310	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1025	361	84	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4224	1489	345	pcph

#### Estimation of V12 Merge Areas

$$L = 852.80 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.590 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 2493 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5713	7050	No
v <sub>3 or av34</sub>		1731 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2493		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5713	4600	No

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

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

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

#### Speed Estimation

Intermediate speed variable,	M <sub>S</sub>	= 0.498	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 53.5	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 60.6	mph
Space mean speed for all vehicles,	S	= 55.5	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl W ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5103	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	1240	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1330	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)	5103	1240	1330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1387	337	361	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5713	1375	1489	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.046 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 262 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		7088	9400	No
FO				
v	v	2725 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	Yes	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34		12		
If yes, v			(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	7088	4600	No
12A			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 31.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.453	
	S		
Space mean speed in ramp influence area,	S	= 54.6	mph
	R		
Space mean speed in outer lanes,	S	= 60.6	mph
	0		
Space mean speed for all vehicles,	S	= 57.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29 DROP LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6343	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	910	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	490	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6343	910	490	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1724	247	133	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7101	1014	543	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.436 \quad \text{Using Equation 8}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3668 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		7101	9600	No
$v_{FO} = v_F - v_R$		6087	9600	No
$v_R$		1014	2000	No
$v_{3 \text{ or } av34}$		1716 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, $v_{12A} = 3668$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3668	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D}$	$= 30.8$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D = 0.519$	
Space mean speed in ramp influence area,	$S_R = 55.5$	mph
Space mean speed in outer lanes,	$S_0 = 74.0$	mph
Space mean speed for all vehicles,	$S = 63.1$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5433	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?	Yes	
Volume on adjacent Ramp	910	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5433	490	910	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1476	133	247	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6083	543	1014	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.150 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 912 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6626	9600	No
v <sub>3 or av34</sub>		2585 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			Yes	
If yes, v <sub>12A</sub> = 2433			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	6626	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.3 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.362	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 59.9	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 65.2	mph
Space mean speed for all vehicles,	S	= 62.7	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB OffRmp to Br Tvrn Rd DRP LN  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5923	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	1090	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	680	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5923	1090	680	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1610	296	185	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6631	1203	754	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.539 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 4128 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6631	7200	No
$v_{FO} = v_F - v_R$	5428	7200	No
$v_R$	1203	2000	No
$v_{3 \text{ or } av34}$	2503 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, $v_{12A} = 4128$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4128	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 28.9 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.536$	
Space mean speed in ramp influence area,	$S_R = 55.0$	mph
Space mean speed in outer lanes,	$S_0 = 70.9$	mph
Space mean speed for all vehicles,	$S = 60.1$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4833	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	680	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1090	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4833	680	1090	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1313	185	296	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5411	754	1203	pcph

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

$$L = 1258.11 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.610 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3299 \text{ pc/h}$$

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

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6165	7200	No
v <sub>3 or av34</sub>		2112 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 3299		(Equation 25-8)	

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

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6165	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.5 \text{ pc/mi/ln}$$

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

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

Intermediate speed variable,	M	= 0.465	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.2	mph
Space mean speed for all vehicles,	S	= 59.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 EB  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2593	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	1190	vph
Length of first accel/decel lane	1200	ft
Length of second accel/decel lane		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	Off	
Distance to adjacent Ramp	1300	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2593	1190	1180	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	705	323	321	v
Trucks and buses	6	6	3	%
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	0.971	0.971	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2903	1332	1302	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

2903

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

4235

0

pc/h

Maximum

4700

(Equation 25-4 or 25-5)

LOS F?

No

Is

v

3 or

av34

> 2700 pc/h?

No

Is

v

3 or

av34

> 1.5 v /2

No

If yes, v

= 2903

(Equation 25-8)

12A

Flow Entering Merge Influence Area

v

R12

Actual

4235

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 30.4 pc/mi/ln

R R 12 A

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

Speed Estimation

Intermediate speed variable,

M = 0.506

Space mean speed in ramp influence area,

S = 53.4 mph

Space mean speed in outer lanes,

S = N/A mph

Space mean speed for all vehicles,

S = 53.4 mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332 DROP LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2353	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	760	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1460	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2353	760	1460	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	639	207	397	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2634	855	1635	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 0.655 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2020$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2634	7050	No
$v_{FO} = v_F - v_R$	1779	7050	No
$v_R$	855	2000	No
$v_{3 \text{ or } av34}$	614 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, $v_{12A} = 2020$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2020	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 14.0$  pc/mi/ln

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.505$	
Space mean speed in ramp influence area,	$S_R = 53.4$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 56.7$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1593	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	1460	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	760	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1593	1460	760	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	433	397	207	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1783	1635	855	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

1783

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

3418

0

pc/h

Maximum

4700

(Equation 25-4 or 25-5)

LOS F?

No

Is

v

3 or

av34

> 2700 pc/h?

No

Is

v

3 or

av34

> 1.5 v /2

No

If yes, v

= 1783

(Equation 25-8)

12A

Flow Entering Merge Influence Area

v

R12

Actual

3418

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 22.8 pc/mi/ln

R R 12 A

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

Speed Estimation

Intermediate speed variable,

M = 0.344

Space mean speed in ramp influence area,

S = 57.1 mph

Space mean speed in outer lanes,

S = N/A mph

Space mean speed for all vehicles,

S = 57.1 mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off rmp to Tylrsvlle DRP LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2373	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	460	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	490	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	790	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2373	460	490	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	645	125	133	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2657	510	551	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.670 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 1949 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2657	7050	No
$v_{FO} = v_F - v_R$	2147	7050	No
$v_R$	510	2000	No
$v_{3 \text{ or } av34}$	708 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, $v_{12A} = 1949$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	1949	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 16.1 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.474$	
Space mean speed in ramp influence area,	$S_R = 54.1$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 57.8$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1863	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	1265	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	460	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1863	490	460	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	506	133	125	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2086	541	517	pcph

#### Estimation of V12 Merge Areas

$$L = 552.04 \quad (\text{Equation 25-2 or 25-3})$$

EQ

$$P = 0.613 \quad \text{Using Equation 1}$$

FM

$$v_{12} = v_F (P_{FM}) = 1279 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

		Actual	Maximum	LOS F?
v		2627	7050	No
FO				
v	v	807 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v		= 1279	(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	2627	4600	No
R12			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.5 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.257	
	S		
Space mean speed in ramp influence area,	S	= 59.1	mph
	R		
Space mean speed in outer lanes,	S	= 63.9	mph
	0		
Space mean speed for all vehicles,	S	= 60.5	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2528	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	565	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	410	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2528	565	410	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	687	154	111	v
Trucks and buses	6	11	4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2830	648	455	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 0.659 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2087 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2830	7200	No
$v_{FO} = v_F - v_R$	2182	7200	No
$v_R$	648	2000	No
$v_{3 \text{ or } av34}$	743 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, $v_{12A} = 2087$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2087	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 17.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.486$	
Space mean speed in ramp influence area,	$S_R = 56.4$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 60.6$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29 ADD LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1963	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	410	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	565	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1963	410	565	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	533	111	154	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2198	455	648	pcph

#### Estimation of V12 Merge Areas

$$L = 146.01 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.587 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1290 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		2653	7200	No
v <sub>3 or av34</sub>		908 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1290		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2653	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.320	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 61.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 68.5	mph
Space mean speed for all vehicles,	S	= 63.4	mph



Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.21	
Weaving ratio, R	0.24	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	2863	0	580	185	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	778	0	158	50	v
Trucks and buses	6	10	4	6	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.980	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3205	0	643	207	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.42	0.20
Weaving and non-weaving speeds, Si	57.22	65.05
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.23
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	63.24	mph
Weaving segment density, D	16.03	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	8902	pc/h
Capacity as a 15-minute flow rate, c	8643	pc/h
Capacity as a full-hour volume, ch	7952	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	850	2800	a
Average flow rate (pcphpl)	1013	2400	b
Volume ratio, VR	0.21	0.35	c
Weaving ratio, R	0.24	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2258	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	270	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	580	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2258	270	580	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	614	73	158	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2528	296	649	pcph

#### Estimation of V12 Merge Areas

$$L = 566.67 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.603 \quad \text{Using Equation 2}$$

$$FM$$

$$v_{12} = v_F(P) = 1525 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		2824	7200	No
FO				
v	v	1003 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v			(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	2824	4600	No
R12			

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

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

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.261	
	S		
Space mean speed in ramp influence area,	S	= 62.7	mph
	R		
Space mean speed in outer lanes,	S	= 68.2	mph
	0		
Space mean speed for all vehicles,	S	= 64.5	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3309	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	1309	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	640	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3309	1309	640	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	899	356	174	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3705	1473	710	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P = 3705 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		3705	4700	No
$v_{FO} = v_F - v_R$		2232	4700	No
$v_R$		1473	2000	No
$v_{3 \text{ or } 4}$		0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } 4} > 2700 \text{ pc/h?}$			No	
Is $v_{3 \text{ or } 4} > 1.5 v_{12} / 2$			No	
If yes, $v_{12A} = 3705$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3705	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 28.5 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.561$	
Space mean speed in ramp influence area,	$S_R = 52.1$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.1$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 ADD LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2640	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	100	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	640	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2640	100	640	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	717	27	174	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2956	111	720	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

2956

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

3067

0

pc/h

Maximum

4700

(Equation 25-4 or 25-5)

LOS F?

No

Is

v

v

>

2700 pc/h?

No

Is

v

v

>

1.5 v

/2

No

If yes, v

=

2956

(Equation 25-8)

12A

Flow Entering Merge Influence Area

v

R12

Actual

3067

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 20.7 pc/mi/ln

R R 12 A

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

Speed Estimation

Intermediate speed variable,

M

=

0.309

Space mean speed in ramp influence area,

S

=

57.9

mph

Space mean speed in outer lanes,

S

=

N/A

mph

Space mean speed for all vehicles,

S

=

57.9

mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2740	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	390	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	330	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2740		390		330	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	745		106		90	v
Trucks and buses	6		5		6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3068	435	369	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 0.663 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2181 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		3068	7050	No
$v_{FO} = v_F - v_R$		2633	7050	No
$v_R$		435	2000	No
$v_{3 \text{ or } av34}$		887 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, $v_{12A} = 2181$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2181	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 15.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.467$	
Space mean speed in ramp influence area,	$S_R = 54.3$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 58.3$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl E ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2350	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	330	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	390	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2350	330	390	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	639	90	106	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2631	369	435	pcph

#### Estimation of V12 Merge Areas

$$L = 272.22 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.590 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1553 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3000	7050	No
v <sub>3 or av34</sub>		1078 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1553		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3000	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 17.4 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.316	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.7	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 62.9	mph
Space mean speed for all vehicles,	S	= 59.5	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl W ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2680	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	270	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	330	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)	2680	270	330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	728	73	90	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3000	299	369	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.180 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 541 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		3299	9400	No
FO				
v	v	1229 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34		12		
If yes, v		= 1200	(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	3299	4600	No
12A			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.3 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.319	
	S		
Space mean speed in ramp influence area,	S	= 57.7	mph
	R		
Space mean speed in outer lanes,	S	= 63.6	mph
	0		
Space mean speed for all vehicles,	S	= 60.7	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29 DROP LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2950	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	440	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	360	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2950		440		360	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	802		120		98	v
Trucks and buses	6		5		4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3303	490	399	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.436 Using Equation 8

FD

$v_{12} = v_R + (v_F - v_R) P = 1716$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3303	9600	No
$v_{FO} = v_F - v_R$	2813	9600	No
$v_R$	490	2000	No
$v_{3 \text{ or } av34}$	793 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, $v_{12A} = 1716$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	1716	4400	No

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

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 14.1$  pc/mi/ln

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.472$	
Space mean speed in ramp influence area,	$S_R = 56.8$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 64.9$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2510	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	360	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	440	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2510	360	440	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	682	98	120	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2810	399	490	pcph

#### Estimation of V12 Merge Areas

$$L = 336.93 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1662 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3209	7200	No
v <sub>3 or av34</sub>		1148 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1662		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3209	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.2 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.317	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 61.1	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 67.7	mph
Space mean speed for all vehicles,	S	= 63.3	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2470	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	660	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	400	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2470	660	400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	671	179	109	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2765	732	441	pcph

#### Estimation of V12 Merge Areas

$$L = 687.16 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.610 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1686 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3497	7200	No
v <sub>3 or av34</sub>		1079 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1686		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3497	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.8 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.284	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 62.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 67.9	mph
Space mean speed for all vehicles,	S	= 63.7	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 EB  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2000	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	640	vph
Length of first accel/decel lane	1200	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1309	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1300	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2000	640	1309	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	543	174	356	v
Trucks and buses	6	6	3	%
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	0.971	0.971	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2239	717	1444	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2239 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		2956	4700	No
v <sub>3 or av34</sub>	v	0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	v	> 2700 pc/h?	No	
Is v <sub>3 or av34</sub>	v	> 1.5 v <sub>12</sub> / 2	No	
If yes, v <sub>12A</sub>		= 2239	(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2956	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 20.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.312	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.8	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 57.8	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332 DROP LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4036	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	1380	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1400	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4036	1380	1400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1097	375	380	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4519	1552	1567	pcph

# Estimation of V12 Diverge Areas

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

EQ

P = 0.576 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3260$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4519	7050	No
$v_{FO} = v_F - v_R$	2967	7050	No
$v_R$	1552	2000	No
$v_{3 \text{ or } av34}$	1259 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, $v_{12A} = 3260$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3260	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 24.6$  pc/mi/ln

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

# Speed Estimation

Intermediate speed variable,	$D_S = 0.568$	
Space mean speed in ramp influence area,	$S_R = 51.9$	mph
Space mean speed in outer lanes,	$S_0 = 70.3$	mph
Space mean speed for all vehicles,	$S = 56.0$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2656	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	1400	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1380	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2656	1400	1380	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	722	380	375	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2974	1567	1552	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

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

$$FM$$

$$v_{12} = v_F(P) = 2974 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4541	4700	No
v <sub>3 or av34</sub>		0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2974		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4541	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 31.6 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.591	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 51.4	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 51.4	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Rmp to Tylrsvl W DRP LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5126	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	1430	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	340	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	790	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5126	1430	340	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1393	389	92	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5739	1585	382	pcph

#### Estimation of V12 Diverge Areas

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

EQ

$$P = 0.544 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 3843 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		5739	7050	No
$v_{FO} = v_F - v_R$		4154	7050	No
$v_R$		1585	2000	No
$v_{3 \text{ or } av34}$		1896 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, $v_{12A} = 3843$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3843	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D}$		$= 32.4 \quad \text{pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.571$	
Space mean speed in ramp influence area,	$S_R = 51.9$	mph
Space mean speed in outer lanes,	$S_0 = 67.8$	mph
Space mean speed for all vehicles,	$S = 56.2$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3696	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	340	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1430	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3696	340	1430	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1004	92	389	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4138	375	1609	pcph

#### Estimation of V12 Merge Areas

$$L = 955.64 \quad (\text{Equation 25-2 or 25-3})$$

EQ

$$P = 0.613 \quad \text{Using Equation 1}$$

FM

$$v_{12} = v_F (P_{FM}) = 2536 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	4513	7050	No
v <sub>3 or av34</sub>	1602 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?		No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub> = 2536		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4513	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 20.1 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M = 0.304	
Space mean speed in ramp influence area,	S <sub>R</sub> = 58.0	mph
Space mean speed in outer lanes,	S <sub>0</sub> = 61.0	mph
Space mean speed for all vehicles,	S = 59.0	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4996	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	470	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	600	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

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

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	4996		470		600	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	1358		128		163	v
Trucks and buses	6		11		4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5593	539	665	pcph

#### Estimation of V12 Diverge Areas

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

EQ

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

FD

$$v_{12} = v_R + (v_F - v_R) P = 3548 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		5593	7200	No
$v_{FO} = v_F - v_R$		5054	7200	No
$v_R$		539	2000	No
$v_{3 \text{ or } av34}$		2045 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, $v_{12A} = 3548$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3548	4400	No

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

Density,	$D = 4.252 + 0.0086 v_R - 0.009 L_D$	$= 30.3$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence D			

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.477$	
Space mean speed in ramp influence area,	$S_R = 56.7$	mph
Space mean speed in outer lanes,	$S_0 = 72.7$	mph
Space mean speed for all vehicles,	$S = 61.6$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29 ADD LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4526	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	600	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	470	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4526	600	470	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1230	163	128	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5067	665	539	pcph

#### Estimation of V12 Merge Areas

$$L = 804.92 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.587 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2974 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5732	7200	No
v <sub>3 or av34</sub>		2093 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2974		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5732	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 31.4 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.446	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.5	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.3	mph
Space mean speed for all vehicles,	S	= 59.8	mph

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.14	
Weaving ratio, R	0.49	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	5001	0	430	410	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	1359	0	117	111	v
Trucks and buses	6	10	4	6	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.980	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5598	0	476	459	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.59	0.29
Weaving and non-weaving speeds, Si	52.73	61.34
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.02
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	59.94	mph
Weaving segment density, D	27.25	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	9221	pc/h
Capacity as a 15-minute flow rate, c	8952	pc/h
Capacity as a full-hour volume, ch	8236	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	935	2800	a
Average flow rate (pcphpl)	1633	2400	b
Volume ratio, VR	0.14	0.35	c
Weaving ratio, R	0.49	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with Low Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4546	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	450	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	430	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4546	450	430	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1235	122	117	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5090	494	481	pcph

#### Estimation of V12 Merge Areas

$$L = 1157.31 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.566 \text{ Using Equation 2}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2880 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5584	7200	No
v <sub>3 or av34</sub>		2210 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		Yes	
If yes, v <sub>12A</sub>	= 2908		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	5584	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.2 \text{ pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.354	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 60.1	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 63.9	mph
Space mean speed for all vehicles,	S	= 61.5	mph

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3773	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1025	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2112	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2112	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.3	mi/h
Number of lanes, N	2	
Density, D	35.6	pc/mi/ln

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4083	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1110	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1524	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1524	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	23.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	6343	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1724	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1420	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1420	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	5	
Density, D	21.8	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5923	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1610	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1706	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1706	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.8	mi/h
Number of lanes, N	4	
Density, D	24.8	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	5513	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1498	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2057	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2057	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	3	
Density, D	32.3	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2938	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	798	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1645	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1645	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	2	
Density, D	25.4	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2208	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	600	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	824	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	824	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	12.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	2128	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	578	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	596	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	596	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	4	
Density, D	9.2	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

### Flow Inputs and Adjustments

Volume, V	2338	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	635	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	873	pc/h/ln

### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

### LOS and Performance Measures

Flow rate, vp	873	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.5	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2488	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	676	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	928	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	928	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.3	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 46 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3320	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	902	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1858	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1858	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.4	mi/h
Number of lanes, N	2	
Density, D	29.3	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 49 & 51  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2740	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	745	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1023	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1023	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	15.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 51 & 1  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2950	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	802	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	661	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	661	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	5	
Density, D	10.2	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 1 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	2870	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	780	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	2.0	
Recreational vehicle PCE, ER	3.0	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	827	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	827	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	11.8	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Northbound  
From/To: btw exits 2 & 3  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3130	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	851	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1168	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1168	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.7	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 49 & 46  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3953	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1074	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.05	%
Segment length	0.33	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2213	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2213	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	56.7	mi/h
Number of lanes, N	2	
Density, D	39.0	pc/mi/ln

Level of service, LOS

E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 51 & 49  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	3913	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1063	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	3.00	%
Segment length	0.47	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1460	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1460	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	22.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.



Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 1 & 51  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4953	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1346	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-0.73	%
Segment length	0.49	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1386	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1386	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	4	
Density, D	21.3	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 2 & 1  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4893	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1330	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-3.10	%
Segment length	0.75	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1826	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1826	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.6	mi/h
Number of lanes, N	3	
Density, D	27.0	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

---

Operational Analysis

---

Analyst: TPR  
Agency or Company: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Direction: I-95 Southbound  
From/To: btw exits 3 & 2  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

---

Flow Inputs and Adjustments

---

Volume, V	4478	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1217	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1671	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	1671	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.0	mi/h
Number of lanes, N	3	
Density, D	24.2	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3773	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	1180	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1190	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3773	1180	1190	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1025	321	323	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4224	1327	1319	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

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

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 4224 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4224	4700	No
$v_{FO} = v_F - v_R$	2897	4700	No
$v_R$	1327	2000	No
$v_3$ or $v_{av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_3$ or $v_{av34} > 2700$ pc/h?		No	
Is $v_3$ or $v_{av34} > 1.5 v_{12} / 2$		No	
If yes, $v_{12A} = 4224$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4224	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 32.9 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.547$	
Space mean speed in ramp influence area,	$S_R = 52.4$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.4$	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 ADD LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3783	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	1375	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1190	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2530	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3783	300	1190	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1028	82	323	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4235	333	1339	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

4235

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

4568

0

pc/h

Maximum

4700

(Equation 25-4 or 25-5)

LOS F?

No

Is

v

3 or

av34

>

2700 pc/h?

No

Is

v

3 or

av34

>

1.5 v

/2

No

If yes, v

=

4235

(Equation 25-8)

12A

Flow Entering Merge Influence Area

v

R12

Actual

4568

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v

+ 0.0078 v

- 0.00627 L

=

32.3

pc/mi/ln

R

R

12

A

Level of service for ramp-freeway junction areas of influence

D

Speed Estimation

Intermediate speed variable,

M

=

0.601

Space mean speed in ramp influence area,

S

=

51.2

mph

Space mean speed in outer lanes,

S

=

N/A

mph

Space mean speed for all vehicles,

S

=

51.2

mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4083	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	310	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1330	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4083	310	1330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1110	84	361	v
Trucks and buses	6	5	6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4571	345	1489	pcph

#### Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 0.630 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 3007 \quad \text{pc/h}$$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4571	7050	No
$v_{FO} = v_F - v_R$	4226	7050	No
$v_R$	345	2000	No
$v_{3 \text{ or } av34}$	1564 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, $v_{12A} = 3007$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3007	4400	No

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

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 22.5 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	$D = 0.459$	
Space mean speed in ramp influence area,	$S_R = 54.4$	mph
Space mean speed in outer lanes,	$S_0 = 69.1$	mph
Space mean speed for all vehicles,	$S = 58.7$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl E ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3773	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	1330	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	310	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3773	1330	310	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1025	361	84	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4224	1489	345	pcph

#### Estimation of V12 Merge Areas

$$L = 852.80 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.590 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 2493 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5713	7050	No
v <sub>3 or av34</sub>		1731 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2493		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5713	4600	No

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

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

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.498	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 53.5	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 60.6	mph
Space mean speed for all vehicles,	S	= 55.5	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl W ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5103	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	1240	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1330	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)	5103	1240	1330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1387	337	361	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5713	1375	1489	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.046 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 262 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		7088	9400	No
FO				
v	v	2725 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	Yes	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34		12		
If yes, v			(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	7088	4600	No
12A			

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 31.7 \quad \text{pc/mi/ln}$$

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

#### Speed Estimation

Intermediate speed variable,	M	= 0.453	
	S		
Space mean speed in ramp influence area,	S	= 54.6	mph
	R		
Space mean speed in outer lanes,	S	= 60.6	mph
	0		
Space mean speed for all vehicles,	S	= 57.3	mph



Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29 DROP LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

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

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6343	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	910	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

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

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	490	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6343	910	490	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1724	247	133	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7101	1014	543	pcph

#### Estimation of V12 Diverge Areas

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

EQ

P = 0.436 Using Equation 8

FD

$v_{12} = v_R + (v_F - v_R) P = 3668 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7101	9600	No
$v_{FO} = v_F - v_R$	6087	9600	No
$v_R$	1014	2000	No
$v_{3 \text{ or } av34}$	1716 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, $v_{12A} = 3668$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3668	4400	No

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

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 30.8 \text{ pc/mi/ln}$

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

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.519$	
Space mean speed in ramp influence area,	$S_R = 55.5$	mph
Space mean speed in outer lanes,	$S_0 = 74.0$	mph
Space mean speed for all vehicles,	$S = 63.1$	mph

Phone: Fax:  
E-mail:

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

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

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

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5433	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?	Yes	
Volume on adjacent Ramp	910	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

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

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5433	490	910	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1476	133	247	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6083	543	1014	pcph

#### Estimation of V12 Merge Areas

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

$$EQ$$

$$P = 0.150 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 912 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6626	9600	No
v <sub>3 or av34</sub>		2585 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			Yes	
If yes, v <sub>12A</sub> = 2433			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>12A</sub>	6626	4600	No

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

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.3 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	M	= 0.362	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 59.9	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 65.2	mph
Space mean speed for all vehicles,	S	= 62.7	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB OffRmp to Br Tvrn Rd DRP LN  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5923	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	1090	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	660	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5923	1090	660	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1610	296	179	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6631	1203	732	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.539 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 4128 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		6631	7200	No
$v_{FO} = v_F - v_R$		5428	7200	No
$v_R$		1203	2000	No
$v_{3 \text{ or } av34}$		2503 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, $v_{12A} = 4128$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	4128	4400	No

#### Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 28.9 \text{ pc/mi/ln}$

Level of service for ramp-freeway junction areas of influence D

#### Speed Estimation

Intermediate speed variable,	$D = 0.536$	
Space mean speed in ramp influence area,	$S_R = 55.0$	mph
Space mean speed in outer lanes,	$S_0 = 70.9$	mph
Space mean speed for all vehicles,	$S = 60.1$	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4833	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	680	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1090	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4833	680	1090	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1313	185	296	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5411	754	1203	pcph

#### Estimation of V12 Merge Areas

$$L = 1258.11 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.610 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 3299 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		6165	7200	No
v <sub>3 or av34</sub>		2112 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 3299		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	6165	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.5 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence D

#### Speed Estimation

Intermediate speed variable,	M	= 0.465	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.2	mph
Space mean speed for all vehicles,	S	= 59.3	mph



Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 EB  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2593	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	1190	vph
Length of first accel/decel lane	1200	ft
Length of second accel/decel lane		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	Off	
Distance to adjacent Ramp	1300	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2593	1190	1180	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	705	323	321	v
Trucks and buses	6	6	3	%
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	0.971	0.971	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2903	1332	1302	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

2903

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

4235

0

pc/h

Maximum

4700

(Equation 25-4 or 25-5)

LOS F?

No

Is

v

3 or

av34

>

2700

pc/h?

No

Is

v

3 or

av34

>

1.5

v

/2

12

No

If yes, v

=

2903

(Equation 25-8)

12A

Flow Entering Merge Influence Area

v

R12

Actual

4235

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 30.4 pc/mi/ln

R R 12 A

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,

M = 0.506

S

Space mean speed in ramp influence area,

S = 53.4 mph

R

Space mean speed in outer lanes,

S = N/A mph

0

Space mean speed for all vehicles,

S = 53.4 mph

Phone:  
E-mail:

Fax:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332 DROP LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2208	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	730	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1460	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2208	730	1460	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	600	198	397	v
Trucks and buses	6	7	6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2472	821	1635	pcph

#### Estimation of V12 Diverge Areas

$$L = \text{(Equation 25-8 or 25-9)}$$

EQ

$$P = 0.660 \quad \text{Using Equation 5}$$

FD

$$v_{12} = v_R + (v_F - v_R) P = 1911 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		2472	7050	No
$v_{FO} = v_F - v_R$		1651	7050	No
$v_R$		821	2000	No
$v_{3 \text{ or } av34}$		561 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, $v_{12A} = 1911$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	1911	4400	No

#### Level of Service Determination (if not F)

Density,	$D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D}$	$= 13.0$	pc/mi/ln
Level of service for ramp-freeway junction areas of influence B			

#### Speed Estimation

Intermediate speed variable,	$D = 0.502$	
Space mean speed in ramp influence area,	$S_R = 53.5$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 56.7$	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1478	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	1460	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	730	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1478	1460	730	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	402	397	198	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1655	1635	821	pcph

-----Estimation of V12 Merge Areas-----

$$L = \text{(Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 1.000 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F(P) = 1655 \quad \text{pc/h}$$

-----Capacity Checks-----

		Actual	Maximum	LOS F?
v		3290	4700	No
FO				
v	v	0 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34	12			
If yes, v	= 1655	(Equation 25-8)		
12A				

-----Flow Entering Merge Influence Area-----

	Actual	Max Desirable	Violation?
v	3290	4600	No
R12			

-----Level of Service Determination (if not F)-----

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.8 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

-----Speed Estimation-----

Intermediate speed variable,	M	= 0.329	
	S		
Space mean speed in ramp influence area,	S	= 57.4	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	0		
Space mean speed for all vehicles,	S	= 57.4	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off rmp to Tylrsvlle DRP LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2128	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	440	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	520	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	790	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2128	440	520	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	578	120	141	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2382	488	585	pcph

# Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.678 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 1772$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2382	7050	No
$v_{FO} = v_F - v_R$	1894	7050	No
$v_R$	488	2000	No
$v_{3 \text{ or } av34}$	610 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, $v_{12A} = 1772$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	1772	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 14.5$  pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

# Speed Estimation

Intermediate speed variable,	$D_S = 0.472$	
Space mean speed in ramp influence area,	$S_R = 54.1$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 57.7$	mph



Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1688	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	520	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	440	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1688	520	440	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	459	141	120	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1890	574	495	pcph

#### Estimation of V12 Merge Areas

$$L = 517.16 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.613 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1158 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		2464	7050	No
v <sub>3 or av34</sub>		732 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?			No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2			No	
If yes, v <sub>12A</sub> = 1158			(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2464	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 10.8 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.254	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 59.1	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.2	mph
Space mean speed for all vehicles,	S	= 60.6	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 04/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2338	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	580	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	370	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2338		580		370	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	635		158		101	v
Trucks and buses	6		11		4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2618	665	410	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.664 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 1962 \text{ pc/h}$

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2618	7200	No
$v_{FO} = v_F - v_R$	1953	7200	No
$v_R$	665	2000	No
$v_{3 \text{ or } av34}$	656 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, $v_{12A} = 1962$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	1962	4400	No

#### Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 16.6 \text{ pc/mi/ln}$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.488$	
Space mean speed in ramp influence area,	$S_R = 56.3$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 60.4$	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29 ADD LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1758	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	370	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	580	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1758	370	580	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	478	101	158	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1968	410	665	pcph

#### Estimation of V12 Merge Areas

$$L = 87.16 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.587 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1155 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		2378	7200	No
v <sub>3 or av34</sub>		813 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1155		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2378	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.4 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.316	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 61.2	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 68.9	mph
Space mean speed for all vehicles,	S	= 63.6	mph

Phone: Fax:  
E-mail:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.22	
Weaving ratio, R	0.23	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	2668	0	600	180	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	725	0	163	49	v
Trucks and buses	6	10	4	6	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.980	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2986	0	665	201	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.41	0.20
Weaving and non-weaving speeds, Si	57.50	65.19
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.27
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	63.29	mph
Weaving segment density, D	15.22	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	8785	pc/h
Capacity as a 15-minute flow rate, c	8529	pc/h
Capacity as a full-hour volume, ch	7847	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	866	2800	a
Average flow rate (pcphpl)	963	2400	b
Volume ratio, VR	0.22	0.35	c
Weaving ratio, R	0.23	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.



Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: AM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2068	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	270	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	600	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2068	270	600	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	562	73	163	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2315	296	672	pcph

#### Estimation of V12 Merge Areas

$$L = 521.09 \quad (\text{Equation 25-2 or 25-3})$$

EQ

$$P = 0.606 \quad \text{Using Equation 2}$$

FM

$$v_{12} = v_F (P_{FM}) = 1403 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

	Actual	Maximum	LOS F?
v <sub>FO</sub>	2611	7200	No
v <sub>3 or av34</sub>	912 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub> > 2700 pc/h?		No	
Is v <sub>3 or av34</sub> > 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub> = 1403		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2611	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.0 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.258	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 62.8	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 68.5	mph
Space mean speed for all vehicles,	S	= 64.7	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3320	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	1320	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	640	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2530	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3320	1320	640	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	902	359	174	v
Trucks and buses	6	7	4	%
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	0.971	0.966	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3717	1485	710	pcph

# Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 1.000 Using Equation 0

FD

$v_{12} = v_R + (v_F - v_R) P_{FD} = 3717 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3717	4700	No
$v_{FO} = v_F - v_R$	2232	4700	No
$v_R$	1485	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, $v_{12A} = 3717$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3717	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 28.6 \text{ pc/mi/ln}$

Level of service for ramp-freeway junction areas of influence D

# Speed Estimation

Intermediate speed variable,	$D_S = 0.562$	
Space mean speed in ramp influence area,	$S_R = 52.1$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 52.1$	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 ADD LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2640	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	100	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	640	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2530	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2640	100	640	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	717	27	174	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2956	111	720	pcph

Estimation of V12 Merge Areas

L

=

(Equation 25-2 or 25-3)

EQ

P

=

1.000

Using Equation

0

FM

v

=

v

(P

)

=

2956

pc/h

12

F

FM

Capacity Checks

v

FO

v

3 or

av34

Actual

3067

0

pc/h

Maximum

4700

(Equation 25-4 or 25-5)

LOS F?

No

Is

v

3 or

av34

>

2700 pc/h?

No

Is

v

3 or

av34

>

1.5 v

/2

No

If yes, v

=

2956

(Equation 25-8)

12A

Flow Entering Merge Influence Area

v

R12

Actual

3067

Max Desirable

4600

Violation?

No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 20.7 pc/mi/ln

R R 12 A

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,

M = 0.309

Space mean speed in ramp influence area,

S = 57.9 mph

Space mean speed in outer lanes,

S = N/A mph

Space mean speed for all vehicles,

S = 57.9 mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB off ramp to Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2740	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	390	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	330	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1250	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2740		390		330	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	745		106		90	v
Trucks and buses	6		5		6	%
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	0.971	0.976	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3068	435	369	pcph

#### Estimation of V12 Diverge Areas

$$L = \text{(Equation 25-8 or 25-9)}$$

$$EQ$$

$$P = 0.663 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2181 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		3068	7050	No
$v_{FO} = v_F - v_R$		2633	7050	No
$v_R$		435	2000	No
$v_{3 \text{ or } av34}$		887 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, $v_{12A} = 2181$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2181	4400	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 15.4 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$D = 0.467$	
Space mean speed in ramp influence area,	$S_R = 54.3$	mph
Space mean speed in outer lanes,	$S_0 = 71.3$	mph
Space mean speed for all vehicles,	$S = 58.3$	mph



Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl E ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2350	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	330	vph
Length of first accel/decel lane	455	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	390	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1250	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2350	330	390	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	639	90	106	v
Trucks and buses	6	6	5	%
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	0.971	0.971	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2631	369	435	pcph

#### Estimation of V12 Merge Areas

$$L = 272.22 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.590 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1553 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3000	7050	No
v <sub>3 or av34</sub>		1078 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1553		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3000	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 17.4 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.316	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.7	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 62.9	mph
Space mean speed for all vehicles,	S	= 59.5	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On rmp frm Tylrsvl W ADD LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2680	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	270	vph
Length of first accel/decel lane	275	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	330	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)	2680	270	330	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	728	73	90	v
Trucks and buses	6	4	6	%
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	0.971	0.980	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3000	299	369	pcph

#### Estimation of V12 Merge Areas

$$L = \text{(Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.180 \quad \text{Using Equation 4}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 541 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v		3299	9400	No
FO				
v	v	1229 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34		12		
If yes, v		= 1200	(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	3299	4600	No
12A			

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.3 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.319	
	S		
Space mean speed in ramp influence area,	S	= 57.7	mph
	R		
Space mean speed in outer lanes,	S	= 63.6	mph
	0		
Space mean speed for all vehicles,	S	= 60.7	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB Off Ramp to NJ29 DROP LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2950	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	440	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	360	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	545	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2950	440	360	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	802	120	98	v
Trucks and buses	6	5	4	%
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	0.971	0.976	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3303	490	399	pcph

# Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.436 Using Equation 8

FD

$v_{12} = v_R + (v_F - v_R) P = 1716$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3303	9600	No
$v_{FO} = v_F - v_R$	2813	9600	No
$v_R$	490	2000	No
$v_{3 \text{ or } av34}$	793 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, $v_{12A} = 1716$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	1716	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 14.1$  pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

# Speed Estimation

Intermediate speed variable,	$D_S = 0.472$	
Space mean speed in ramp influence area,	$S_R = 56.8$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 64.9$	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2510	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	360	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	440	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	545	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2510	360	440	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	682	98	120	v
Trucks and buses	6	4	5	%
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	0.971	0.980	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2810	399	490	pcph

#### Estimation of V12 Merge Areas

$$L = 336.93 \quad (\text{Equation 25-2 or 25-3})$$

EQ

$$P = 0.591 \quad \text{Using Equation 1}$$

FM

$$v_{12} = v_F (P_{FM}) = 1662 \quad \text{pc/h}$$

12 F FM

#### Capacity Checks

		Actual	Maximum	LOS F?
v		3209	7200	No
FO				
v	v	1148 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	No	
3 or av34		12		
If yes, v		= 1662	(Equation 25-8)	
12A				

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	3209	4600	No
R12			

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.2 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.317	
	S		
Space mean speed in ramp influence area,	S	= 61.1	mph
	R		
Space mean speed in outer lanes,	S	= 67.7	mph
	0		
Space mean speed for all vehicles,	S	= 63.3	mph



Phone:  
E-mail:

Fax:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB OffRmp to Br Tvrn Rd DRP LN  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2870	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	400	vph
Length of first accel/decel lane	1210	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	660	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2545	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2870	400	660	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	780	109	179	v
Trucks and buses	6	3	4	%
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	0.971	0.985	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3213	441	732	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.659 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 2269$  pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3213	7200	No
$v_{FO} = v_F - v_R$	2772	7200	No
$v_R$	441	2000	No
$v_{3 \text{ or } av34}$	944 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, $v_{12A} = 2269$		(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	2269	4400	No

#### Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 L_D = 12.9$  pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.468$	
Space mean speed in ramp influence area,	$S_R = 56.9$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S = 61.6$	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from Bear Tavern Rd  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2470	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	660	vph
Length of first accel/decel lane	1150	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	400	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2545	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2470	660	400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	671	179	109	v
Trucks and buses	6	4	3	%
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	0.971	0.980	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2765	732	441	pcph

#### Estimation of V12 Merge Areas

$$L = 687.16 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.610 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1686 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		3497	7200	No
v <sub>3 or av34</sub>		1079 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 1686		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	3497	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.8 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.284	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 62.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 67.9	mph
Space mean speed for all vehicles,	S	= 63.7	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Northbound  
Junction: NB On ramp from PA332 EB  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2000	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	640	vph
Length of first accel/decel lane	1200	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1320	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1300	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2000	640	1320	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	543	174	359	v
Trucks and buses	6	6	3	%
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	0.971	0.971	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2239	717	1456	pcph

#### Estimation of V12 Merge Areas

$$L = \text{(Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 1.000 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2239 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		2956	4700	No
v <sub>3 or av34</sub>	v	0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	v	> 2700 pc/h?	No	
Is v <sub>3 or av34</sub>	v	> 1.5 v <sub>12</sub> / 2	No	
If yes, v <sub>12A</sub>		= 2239	(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	2956	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 20.7 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

#### Speed Estimation

Intermediate speed variable,	M	= 0.312	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 57.8	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 57.8	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to PA332 DROP LANE  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3913	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	1360	vph
Length of first accel/decel lane	850	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1400	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2525	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	3913		1360		1400	vph
Peak-hour factor, PHF	0.92		0.92		0.92	
Peak 15-min volume, v15	1063		370		380	v
Trucks and buses	6		7		6	%
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	0.971	0.966	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4381	1530	1567	pcph

# Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.580 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3184$  pc/h

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4381	7050	No
$v_{FO} = v_F - v_R$	2851	7050	No
$v_R$	1530	2000	No
$v_{3 \text{ or } av34}$	1197 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, $v_{12A} = 3184$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3184	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,	$D_S = 0.566$	
Space mean speed in ramp influence area,	$S_R = 52.0$	mph
Space mean speed in outer lanes,	$S_0 = 70.5$	mph
Space mean speed for all vehicles,	$S = 56.0$	mph



Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from PA 332  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2553	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	1400	vph
Length of first accel/decel lane	1375	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1360	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2525	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2553	1400	1360	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	694	380	370	v
Trucks and buses	6	6	7	%
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	0.971	0.971	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2858	1567	1530	pcph

#### Estimation of V12 Merge Areas

$$L = \text{(Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 1.000 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 2858 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4425	4700	No
v <sub>3 or av34</sub>	v	0 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	v	> 2700 pc/h?	No	
Is v <sub>3 or av34</sub>	v	> 1.5 v <sub>12</sub> / 2	No	
If yes, v <sub>12A</sub>		= 2858	(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4425	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 30.6 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence D

#### Speed Estimation

Intermediate speed variable,	M	= 0.550	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 52.3	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= N/A	mph
Space mean speed for all vehicles,	S	= 52.3	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Rmp to Tylrsvle DRP LN  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4953	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	1395	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	355	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	790	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4953	1395	355	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1346	379	96	v
Trucks and buses	6	4	7	%
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	0.971	0.980	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5545	1547	399	pcph

#### Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.550 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3747 \text{ pc/h}$

#### Capacity Checks

		Actual	Maximum	LOS F?
$v_{Fi} = v_F$		5545	7050	No
$v_{FO} = v_F - v_R$		3998	7050	No
$v_R$		1547	2000	No
$v_{3 \text{ or } av34}$		1798 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, $v_{12A} = 3747$			(Equation 25-18)	

#### Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3747	4400	No

#### Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_R - 0.009 \frac{L}{D} = 31.5 \text{ pc/mi/ln}$

Level of service for ramp-freeway junction areas of influence D

#### Speed Estimation

Intermediate speed variable,	$D_S = 0.567$	
Space mean speed in ramp influence area,	$S_R = 52.0$	mph
Space mean speed in outer lanes,	$S_0 = 68.2$	mph
Space mean speed for all vehicles,	$S = 56.3$	mph

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Taylorsville  
Jurisdiction: Bucks County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3558	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	355	vph
Length of first accel/decel lane	1265	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1395	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1400	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3558	355	1395	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	967	96	379	v
Trucks and buses	6	3	7	%
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	0.971	0.985	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3983	392	1569	pcph

#### Estimation of V12 Merge Areas

$$L = 926.11 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.613 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2441 \text{ pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		4375	7050	No
v <sub>3 or av34</sub>		1542 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2441		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	4375	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 19.5 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

#### Speed Estimation

Intermediate speed variable,	M	= 0.299	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 58.1	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 61.2	mph
Space mean speed for all vehicles,	S	= 59.2	mph

Phone: Fax:  
E-mail:

-----Diverge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB Off Ramp to NJ 29  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4893	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	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?	Yes	
Volume on adjacent ramp	550	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	880	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4893	490	550	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1330	133	149	v
Trucks and buses	6	11	4	%
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	0.971	0.948	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5478	562	610	pcph

# Estimation of V12 Diverge Areas

L = (Equation 25-8 or 25-9)

EQ

P = 0.597 Using Equation 5

FD

$v_{12} = v_R + (v_F - v_R) P = 3498 \text{ pc/h}$

# Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5478	7200	No
$v_{FO} = v_F - v_R$	4916	7200	No
$v_R$	562	2000	No
$v_{3 \text{ or } av34}$	1980 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, $v_{12A} = 3498$		(Equation 25-18)	

# Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
$v_{12}$	3498	4400	No

# Level of Service Determination (if not F)

Density,  $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 29.8 \text{ pc/mi/ln}$

Level of service for ramp-freeway junction areas of influence D

# Speed Estimation

Intermediate speed variable,	$D_S = 0.479$	
Space mean speed in ramp influence area,	$S_R = 56.6$	mph
Space mean speed in outer lanes,	$S_0 = 73.0$	mph
Space mean speed for all vehicles,	$S = 61.6$	mph



Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from NJ 29 ADD LANE  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4403	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	550	vph
Length of first accel/decel lane	338	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	490	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	880	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4403	550	490	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1196	149	133	v
Trucks and buses	6	4	11	%
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	0.971	0.980	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4929	610	562	pcph

#### Estimation of V12 Merge Areas

$$L = 763.62 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.587 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 2893 \quad \text{pc/h}$$

#### Capacity Checks

		Actual	Maximum	LOS F?
v <sub>FO</sub>		5539	7200	No
v <sub>3 or av34</sub>		2036 pc/h	(Equation 25-4 or 25-5)	
Is v <sub>3 or av34</sub>	> 2700 pc/h?		No	
Is v <sub>3 or av34</sub>	> 1.5 v <sub>12</sub> / 2		No	
If yes, v <sub>12A</sub>	= 2893		(Equation 25-8)	

#### Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v <sub>R12</sub>	5539	4600	No

#### Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 30.4 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence D

#### Speed Estimation

Intermediate speed variable,	M	= 0.427	
Space mean speed in ramp influence area,	S <sub>R</sub>	= 58.0	mph
Space mean speed in outer lanes,	S <sub>0</sub>	= 64.5	mph
Space mean speed for all vehicles,	S	= 60.3	mph

Phone:  
E-mail:

Fax:

### Operational Analysis

Analyst: TPR  
Agency/Co.: AECOM  
Date Performed: 4/12/11  
Analysis Time Period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Weaving Location: Bear Tavern Road  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

### Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2050	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.15	
Weaving ratio, R	0.48	

### Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	4888	0	445	410	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	1328	0	121	111	v
Trucks and buses	6	10	4	6	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.952	0.980	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5472	0	493	459	pc/h

### Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.59	0.29
Weaving and non-weaving speeds, Si	52.82	61.38
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.04
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

\_\_\_\_\_Weaving Segment Speed, Density, Level of Service and Capacity\_\_\_\_\_

Weaving segment speed, S	59.94	mph
Weaving segment density, D	26.79	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	9199	pc/h
Capacity as a 15-minute flow rate, c	8931	pc/h
Capacity as a full-hour volume, ch	8217	pc/h

\_\_\_\_\_Limitations on Weaving Segments\_\_\_\_\_

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	952	2800	a
Average flow rate (pcphpl)	1606	2400	b
Volume ratio, VR	0.15	0.35	c
Weaving ratio, R	0.48	N/A	d
Weaving length (ft)	2050	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:  
E-mail:

-----Merge Analysis-----

Analyst: TPR  
Agency/Co.: AECOM  
Date performed: 4/12/11  
Analysis time period: PM Peak  
Freeway/Dir of Travel: I-95 Southbound  
Junction: SB On ramp from Bear Tavern E  
Jurisdiction: Mercer County  
Analysis Year: 2030 Build with High Toll  
Description: Scudder Falls

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4443	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	450	vph
Length of first accel/decel lane	1203	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	445	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	440	ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4443	450	445	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	1207	122	121	v
Trucks and buses	6	2	6	%
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	0.971	0.990	0.971	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4974	494	498	pcph

-----Estimation of V12 Merge Areas-----

$$L = 1132.48 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.567 \text{ Using Equation 2}$$

$$FM$$

$$v_{12} = v_F(P) = 2822 \text{ pc/h}$$

-----Capacity Checks-----

		Actual	Maximum	LOS F?
v		5468	7200	No
FO				
v	v	2152 pc/h	(Equation 25-4 or 25-5)	
3 or av34				
Is v	v	> 2700 pc/h?	No	
3 or av34				
Is v	v	> 1.5 v /2	Yes	
3 or av34	12			
If yes, v	= 2842	(Equation 25-8)		
12A				

-----Flow Entering Merge Influence Area-----

	Actual	Max Desirable	Violation?
v	5468	4600	No
12A			

-----Level of Service Determination (if not F)-----

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.7 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

-----Speed Estimation-----

Intermediate speed variable,	M	= 0.346	
	S		
Space mean speed in ramp influence area,	S	= 60.3	mph
	R		
Space mean speed in outer lanes,	S	= 64.1	mph
	0		
Space mean speed for all vehicles,	S	= 61.7	mph