

APPENDIX O

2020 & 2040 Build 2 Sub Scenario Freeway HCS Operational Analysis

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency/Company	AECOM	Weaving Segment Location	Seg 1-Bet Copans & Sample
Date Performed		Analysis Year	2020 Build 2A
Analysis Time Period	AM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2380ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4305	0.95	3	0	1.5	1.2	0.985	1.00	4600
V_{RF}	355	0.92	2	0	1.5	1.2	0.990	1.00	390
V_{FR}	790	0.92	2	0	1.5	1.2	0.990	1.00	867
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	4600							V =	5857
V_W	1257								
VR	0.215								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	1257 lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	1692 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1467 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	3159 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	766

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5777 veh/h	Weaving intensity factor, W	0.283
Weaving segment capacity, c_w	8765 veh/h	Weaving segment speed, S	54.7 mph
Weaving segment v/c ratio	0.659	Average weaving speed, S_W	57.9 mph
Weaving segment density, D	26.8 pc/mi/ln	Average non-weaving speed, S_{NW}	53.9 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	4686 ft

Notes

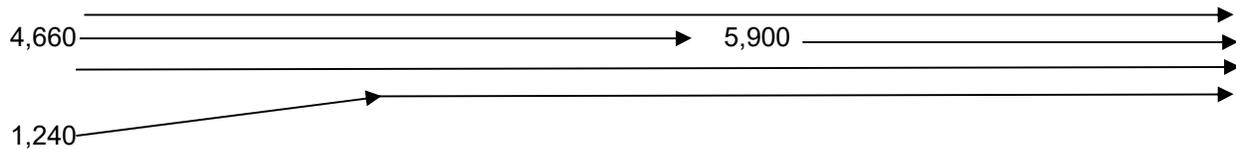
- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	<i>I-95 NB</i>
Agency or Company	<i>AECOM</i>	From/To	<i>Seg 2-Bet Off & On from Sample</i>
Date Performed		Jurisdiction	
Analysis Time Period	<i>AM</i>	Analysis Year	<i>2020 Build 2A</i>
Project Description <i>SW 10th Street SIMR</i>			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
		<input type="checkbox"/> Planning Data	
Flow Inputs			
Volume, V	<i>4660</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
			Up/Down %
			<i>0.95</i>
			<i>3</i>
			<i>0</i>
			<i>Level</i>
			<i>mi</i>
Calculate Flow Adjustments			
f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>
Speed Inputs		Calc Speed Adj and FFS	
Lane Width		ft	
Rt-Side Lat. Clearance		ft	f _{LV}
Number of Lanes, N	<i>3</i>		f _{LC}
Total Ramp Density, TRD		ramps/mi	TRD Adjustment
FFS (measured)	<i>70.0</i>	mph	FFS
Base free-flow Speed, BFFS		mph	<i>70.0</i>
			mph
LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	<i>1660</i>	pc/h/ln	Design LOS
S	<i>67.5</i>	mph	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)
D = v _p / S	<i>24.6</i>	pc/mi/ln	S
LOS	<i>C</i>		D = v _p / S
			Required Number of Lanes, N
Glossary		Factor Location	
N - Number of lanes	S - Speed	E _R - Exhibits 11-10, 11-12	f _{LV} - Exhibit 11-8
V - Hourly volume	D - Density	E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9
v _p - Flow rate	FFS - Free-flow speed	f _p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v _p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 3: I-95 Northbound On-Ramp from WB Sample Road
Analysis Period: AM Peak Hour
Analysis Year: 2020 Build 2A



PHF =	0.95	
$V_{fr} =$	5,900	vph
$V_r =$	1,240	vph
$V_f =$	4,660	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain $E_T =$	1.5	
RV % =	0	
Driver Population adj. $f_P =$	1.000	
$V_{fr} =$	$=V_r/(PHF)(f_{HV})(f_P) =$	6,304 pc/h
$V_r =$	$=V_r/(PHF)(f_{HV})(f_P) =$	1,318 pc/h
$V_f =$	$=V_f/(PHF)(f_{HV})(f_P) =$	4,979 pc/h
No. lanes upstream of ramp $N =$	3	

<u>No. Ln</u>	<u>Capacity Check (see Exhibits 25-3 and 25-7):</u>	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,304	0.66	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	4,979	0.69	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,318	0.63	No

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 4-On from Exp
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off $L_{up} =$ ft $V_u =$ veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A 1500 Deceleration Lane Length L_D Freeway Volume, V_F 5900 Ramp Volume, V_R 710 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off $L_{down} =$ 2950 ft $V_D =$ 250 veh/h
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Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5900	0.95	Level	3	0	0.985	1.00	6304
Ramp	710	0.92	Level	2	0	0.990	1.00	779
UpStream								
DownStream	250	0.92	Level	2	0	0.990	1.00	274

Merge Areas

Diverge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 $L_{EQ} =$
 $P_{FM} =$ 0.120 using Equation (Exhibit 13-6)
 $V_{12} =$ 759 pc/h
 V_3 or V_{av34} 2772 pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ 2521 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 $L_{EQ} =$
 $P_{FD} =$ using Equation (Exhibit 13-7)
 $V_{12} =$ pc/h
 V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V_{FO}	7083	Exhibit 13-8	No	V_F		Exhibit 13-8	
				$V_{FO} = V_F - V_R$		Exhibit 13-8	
				V_R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	3602	Exhibit 13-8 4600:All	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$
 $D_R =$ 25.4 (pc/mi/ln)
 LOS = C (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$
 $D_R =$ (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

$M_S =$ 0.314 (Exhibit 13-11)
 $S_R =$ 61.2 mph (Exhibit 13-11)
 $S_0 =$ 65.9 mph (Exhibit 13-11)
 $S =$ 63.4 mph (Exhibit 13-13)

Speed Determination

$D_s =$ (Exhibit 13-12)
 $S_R =$ mph (Exhibit 13-12)
 $S_0 =$ mph (Exhibit 13-12)
 $S =$ mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 5-Off to Exp from GPL
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 2950 ft V _u = 710 veh/h	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 6610 Ramp Volume, V_R 250 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%; vertical-align: top;"> Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L_{down} = ft V_D = veh/h </td> </tr> </table>	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6610 Ramp Volume, V _R 250 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6610 Ramp Volume, V _R 250 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h		

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6610	0.95	Level	3	0	0.985	1.00	7062
Ramp	250	0.92	Level	2	0	0.990	1.00	274
UpStream	710	0.92	Level	2	0	0.990	1.00	779
DownStream								

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 3234 pc/h V ₃ or V _{av34} 1914 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	7062	Exhibit 13-8	9600 No
				V _{FO} = V _F - V _R	6788	Exhibit 13-8	9600 No
				V _R	274	Exhibit 13-10	2100 No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3234	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 30.3 (pc/mi/ln) LOS = D (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11)	D _s = 0.323 (Exhibit 13-12)
S _R = mph (Exhibit 13-11)	S _R = 61.0 mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-11)	S ₀ = 73.2 mph (Exhibit 13-12)
S = mph (Exhibit 13-13)	S = 67.1 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 6-South of Off to 10th*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	6360	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P _T	3
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1699* pc/h/ln
 S *67.1* mph
 $D = v_p / S$ *25.3* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

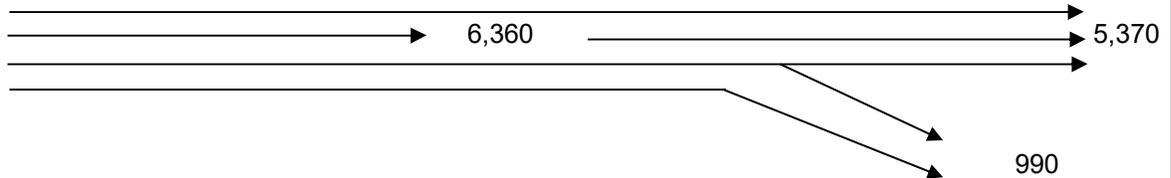
N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 7: I-95 NB Off-Ramp to SW 10th St EB & WB
Analysis Period: AM Peak Hour
Analysis Year: 2020 Build 2A



PHF =	0.95	
v_{fr} =	6,360	vph
v_r =	990	vph
v_f =	5,370	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	6,795 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,053 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	5,737 pc/h
No. lanes upstream of ramp N =	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

$D = 0.0175 (V_{fr}/N) = 29.7 \text{ pc/ln}$

LOS in the Diverge Area (from Density and Exhibit 13-2) =

D

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	6,795	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	5,737	No
2	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	4,200	1,053	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 8-Bet Off & Off Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>5370</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1912* pc/h/ln
 S *64.1* mph
 $D = v_p / S$ *29.8* pc/mi/ln
 LOS *D*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 9-Off to Hillsboro EB&WB
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{up} = ft V _u = veh/h	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 5370 Ramp Volume, V_R 1250 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%; vertical-align: top;"> Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L_{down} = 2100 ft V_D = 1290 veh/h </td> </tr> </table>	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 5370 Ramp Volume, V _R 1250 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2100 ft V _D = 1290 veh/h
Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 5370 Ramp Volume, V _R 1250 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2100 ft V _D = 1290 veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	5370	0.95	Level	3	0	0.985	1.00	5737
Ramp	1250	0.92	Level	2	0	0.990	1.00	1372
UpStream								
DownStream	1290	0.92	Level	2	0	0.990	1.00	1416

Merge Areas	Diverge Areas
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Estimation of v ₁₂	Estimation of v ₁₂
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 0.553 using Equation (Exhibit 13-7) V ₁₂ = 3788 pc/h V ₃ or V _{av34} 1949 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?	
V _{FO}		Exhibit 13-8		V _F	5737	Exhibit 13-8	7200	No
				V _{FO} = V _F - V _R	4365	Exhibit 13-8	7200	No
				V _R	1372	Exhibit 13-10	2100	No

Flow Entering Merge Influence Area	Flow Entering Diverge Influence Area
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	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?	
V _{R12}		Exhibit 13-8		V ₁₂	3788	Exhibit 13-8	4400:All	No

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

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 35.0 (pc/mi/ln) LOS = E (Exhibit 13-2)
---	--

Speed Determination	Speed Determination
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M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)	D _s = 0.421 (Exhibit 13-12) S _R = 58.2 mph (Exhibit 13-12) S ₀ = 73.1 mph (Exhibit 13-12) S = 62.5 mph (Exhibit 13-13)
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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 10-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4120</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1467* pc/h/ln
 S *69.2* mph
 $D = v_p / S$ *21.2* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET										
General Information					Site Information					
Analyst					Freeway/Dir of Travel					
Agency/Company AECOM					I-95 NB					
Date Performed					Weaving Segment Location					
Analysis Time Period AM					2020 Build 2A					
Project Description SW 10th Street SIMR										
Inputs										
Weaving configuration				Two-Sided		Segment type				Freeway
Weaving number of lanes, N				4		Freeway minimum speed, S _{MIN}				15
Weaving segment length, L _S				2970ft		Freeway maximum capacity, C _{IFL}				2400
Freeway free-flow speed, FFS				70 mph		Terrain type				Level
Conversions to pc/h Under Base Conditions										
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)	
V _{FF}	3644	0.95	3	0	1.5	1.2	0.985	1.00	3893	
V _{RF}	2246	0.92	2	0	1.5	1.2	0.990	1.00	2466	
V _{FR}	476	0.92	2	0	1.5	1.2	0.990	1.00	523	
V _{RR}	294	0.92	2	0	1.5	1.2	0.990	1.00	323	
V _{NW}	6882							V =	7205	
V _W	323									
VR	0.045									
Configuration Characteristics										
Minimum maneuver lanes, N _{WL}				0 lc		Minimum weaving lane changes, LC _{MIN}				969 lc/h
Interchange density, ID				0.7 int/mi		Weaving lane changes, LC _W				1462 lc/h
Minimum RF lane changes, LC _{RF}				0 lc/pc		Non-weaving lane changes, LC _{NW}				2452 lc/h
Minimum FR lane changes, LC _{FR}				0 lc/pc		Total lane changes, LC _{ALL}				3914 lc/h
Minimum RR lane changes, LC _{RR}				3 lc/pc		Non-weaving vehicle index, I _{NW}				1431
Weaving Segment Speed, Density, Level of Service, and Capacity										
Weaving segment flow rate, v				7115 veh/h		Weaving intensity factor, W				0.281
Weaving segment capacity, c _w				8500 veh/h		Weaving segment speed, S				54.5 mph
Weaving segment v/c ratio				0.837		Average weaving speed, S _w				57.9 mph
Weaving segment density, D				33.0 pc/mi/ln		Average non-weaving speed, S _{NW}				54.4 mph
Level of Service, LOS				D		Maximum weaving length, L _{MAX}				6144 ft
Notes										
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".										
b. For volumes that exceed the weaving segment capacity, the level of service is "F".										

BASIC FREEWAY SEGMENTS WORKSHEET			
General Information		Site Information	
Analyst	Highway/Direction of Travel <i>I-95 NB</i>		
Agency or Company <i>AECOM</i>	From/To <i>Seg 12-North of Hillsboro</i>		
Date Performed	Jurisdiction		
Analysis Time Period <i>AM</i>	Analysis Year <i>2020 Build 2A</i>		
Project Description <i>SW 10th Street SIMR</i>			
<input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data			
Flow Inputs			
Volume, V <i>5890</i>	veh/h	Peak-Hour Factor, PHF <i>0.95</i>	
AADT	veh/day	%Trucks and Buses, P _T <i>3</i>	
Peak-Hr Prop. of AADT, K		%RVs, P _R <i>0</i>	
Peak-Hr Direction Prop, D		General Terrain: <i>Level</i>	
DDHV = AADT x K x D	veh/h	Grade % Length <i>mi</i>	
Up/Down %			
Calculate Flow Adjustments			
f _p <i>1.00</i>		E _R <i>1.2</i>	
E _T <i>1.5</i>		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] <i>0.985</i>	
Speed Inputs		Calc Speed Adj and FFS	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f _{LW}	mph
Number of Lanes, N <i>4</i>		f _{LC}	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured) <i>70.0</i>	mph	FFS	<i>70.0</i> mph
Base free-flow Speed, BFFS	mph		
LOS and Performance Measures		Design (N)	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v _p = (V or DDHV) / (PHF x N x f _{HV}) <i>1573</i>		Design LOS	
x f _p)	pc/h/ln	v _p = (V or DDHV) / (PHF x N x f _{HV})	
S <i>68.4</i>	mph	x f _p)	
D = v _p / S	<i>23.0</i> pc/mi/ln	S	
LOS <i>C</i>		D = v _p / S	
		Required Number of Lanes, N	
Glossary		Factor Location	
N - Number of lanes	S - Speed	E _R - Exhibits 11-10, 11-12	f _{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9
v _p - Flow rate	FFS - Free-flow speed	f _p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v _p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency/Company	AECOM	Weaving Segment Location	Seg 1-Bet Copans & Sample
Date Performed		Analysis Year	2020 Build 2A
Analysis Time Period	PM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2380ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3985	0.95	3	0	1.5	1.2	0.985	1.00	4258
V_{RF}	415	0.92	2	0	1.5	1.2	0.990	1.00	456
V_{FR}	1560	0.92	2	0	1.5	1.2	0.990	1.00	1713
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	4258							V =	6427
V_W	2169								
VR	0.337								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	2169 lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	2604 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1397 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	4001 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	709

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	6342 veh/h	Weaving intensity factor, W	0.340
Weaving segment capacity, c_w	7006 veh/h	Weaving segment speed, S	49.5 mph
Weaving segment v/c ratio	0.905	Average weaving speed, S_W	56.0 mph
Weaving segment density, D	32.5 pc/mi/ln	Average non-weaving speed, S_{NW}	46.7 mph
Level of Service, LOS	D	Maximum weaving length, L_{MAX}	5989 ft

Notes

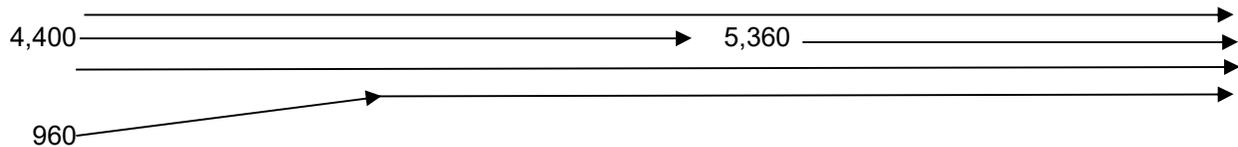
- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	<i>I-95 NB</i>
Agency or Company	<i>AECOM</i>	From/To	<i>Seg 2-Bet Off & On from Sample</i>
Date Performed		Jurisdiction	
Analysis Time Period	<i>PM</i>	Analysis Year	<i>2020 Build 2A</i>
Project Description <i>SW 10th Street SIMR</i>			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			
Flow Inputs			
Volume, V	<i>4400</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
			Up/Down %
			<i>0.95</i>
			<i>3</i>
			<i>0</i>
			<i>Level</i>
			<i>mi</i>
Calculate Flow Adjustments			
f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>
Speed Inputs		Calc Speed Adj and FFS	
Lane Width		ft	
Rt-Side Lat. Clearance		ft	f _{LV}
Number of Lanes, N	<i>3</i>		f _{LC}
Total Ramp Density, TRD		ramps/mi	TRD Adjustment
FFS (measured)	<i>70.0</i>	mph	FFS
Base free-flow Speed, BFFS		mph	<i>70.0</i>
			mph
LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	<i>1567</i>	pc/h/ln	
S	<i>68.4</i>	mph	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)
D = v _p / S	<i>22.9</i>	pc/mi/ln	S
LOS	<i>C</i>		D = v _p / S
			Required Number of Lanes, N
Glossary		Factor Location	
N - Number of lanes	S - Speed	E _R - Exhibits 11-10, 11-12	f _{LV} - Exhibit 11-8
V - Hourly volume	D - Density	E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9
v _p - Flow rate	FFS - Free-flow speed	f _p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v _p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 3: I-95 Northbound On-Ramp from WB Sample Road
Analysis Period: PM Peak Hour
Analysis Year: 2020 Build 2A



PHF =	0.95	
v_{fr} =	5,360	vph
v_r =	960	vph
v_f =	4,400	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	5,727 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,021 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	4,701 pc/h
No. lanes upstream of ramp N =	3	

<u>No. Ln</u>	<u>Capacity Check (see Exhibits 25-3 and 25-7):</u>	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	5,727	0.60	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	4,701	0.65	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,021	0.49	No

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 4-On from Exp
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off $L_{up} =$ ft $V_u =$ veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A 1500 Deceleration Lane Length L_D Freeway Volume, V_F 5360 Ramp Volume, V_R 620 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off $L_{down} =$ 2950 ft $V_D =$ 330 veh/h
--	--	--

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5360	0.95	Level	3	0	0.985	1.00	5727
Ramp	620	0.92	Level	2	0	0.990	1.00	681
UpStream								
DownStream	330	0.92	Level	2	0	0.990	1.00	362

Merge Areas

Diverge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 $L_{EQ} =$
 $P_{FM} =$ 0.133 using Equation (Exhibit 13-6)
 $V_{12} =$ 760 pc/h
 V_3 or V_{av34} 2483 pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ 2290 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 $L_{EQ} =$
 $P_{FD} =$ using Equation (Exhibit 13-7)
 $V_{12} =$ pc/h
 V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}	6408	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V_F		Exhibit 13-8	
$V_{FO} = V_F - V_R$		Exhibit 13-8	
V_R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	3245	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 $D_R =$ 22.5 (pc/mi/ln)
 $LOS =$ C (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 $D_R =$ (pc/mi/ln)
 $LOS =$ (Exhibit 13-2)

Speed Determination

$M_S =$ 0.271 (Exhibit 13-11)
 $S_R =$ 62.4 mph (Exhibit 13-11)
 $S_0 =$ 66.4 mph (Exhibit 13-11)
 $S =$ 64.3 mph (Exhibit 13-13)

Speed Determination

$D_s =$ (Exhibit 13-12)
 $S_R =$ mph (Exhibit 13-12)
 $S_0 =$ mph (Exhibit 13-12)
 $S =$ mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 5-Off to Exp from GPL
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 2950 ft V _u = 620 veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 5980 Ramp Volume, V _R 330 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h	

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	5980	0.95	Level	3	0	0.985	1.00	6389
Ramp	330	0.92	Level	2	0	0.990	1.00	362
UpStream	620	0.92	Level	2	0	0.990	1.00	681
DownStream								

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 2990 pc/h V ₃ or V _{av34} 1699 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	6389	Exhibit 13-8	9600 No
				V _{FO} = V _F - V _R	6027	Exhibit 13-8	9600 No
				V _R	362	Exhibit 13-10	2100 No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	2990	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 28.2 (pc/mi/ln) LOS = D (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)	D _s = 0.331 (Exhibit 13-12) S _R = 60.7 mph (Exhibit 13-12) S ₀ = 74.1 mph (Exhibit 13-12) S = 67.2 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 6-South of Off to 10th*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>5650</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1509* pc/h/ln
 S *68.9* mph
 $D = v_p / S$ *21.9* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

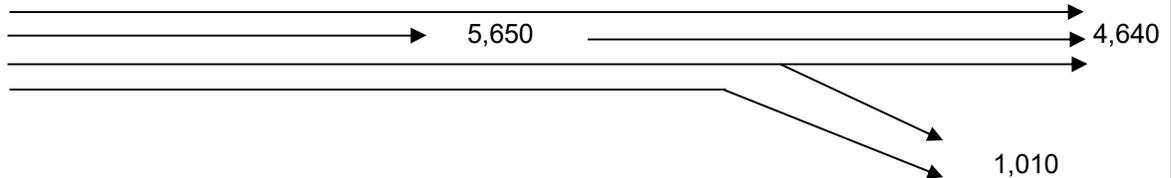
N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 7: I-95 NB Off-Ramp to SW 10th St EB & WB
Analysis Period: PM Peak Hour
Analysis Year: 2020 Build 2A



PHF =	0.95	
v_{fr} =	5,650	vph
v_r =	1,010	vph
v_f =	4,640	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	6,037 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,074 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	4,957 pc/h
No. lanes upstream of ramp N =	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

$D = 0.0175 (V_{fr}/N) = 26.4 \text{ pc/ln}$

LOS in the Diverge Area (from Density and Exhibit 13-2) =

C

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	6,037	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	4,957	No
1	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	2,100	1,074	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 8-Bet Off & Off Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4640</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1652* pc/h/ln
 S *67.6* mph
 $D = v_p / S$ *24.4* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 9-Off to Hillsboro EB&WB
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{up} = ft V _u = veh/h	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 4640 Ramp Volume, V _R 1230 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2100 ft V _D = 1560 veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	4640	0.95	Level	3	0	0.985	1.00	4957
Ramp	1230	0.92	Level	2	0	0.990	1.00	1350
UpStream								
DownStream	1560	0.92	Level	2	0	0.990	1.00	1713

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.574 using Equation (Exhibit 13-7) V ₁₂ = 3420 pc/h V ₃ or V _{av34} 1537 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	4957	Exhibit 13-8	7200 No
				V _{FO} = V _F - V _R	3607	Exhibit 13-8	7200 No
				V _R	1350	Exhibit 13-10	2100 No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3420	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 31.9 (pc/mi/ln) LOS = D (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11)	D _s = 0.419 (Exhibit 13-12)
S _R = mph (Exhibit 13-11)	S _R = 58.3 mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-11)	S ₀ = 74.7 mph (Exhibit 13-12)
S = mph (Exhibit 13-13)	S = 62.5 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 10-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>3410</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1214* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *17.3* pc/mi/ln
 LOS *B*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst					Freeway/Dir of Travel				
Agency/Company AECOM					I-95 NB				
Date Performed					Weaving Segment Location				
Analysis Time Period PM					Seg 11-Bet On & Off to Exp				
Analysis Year					2020 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Weaving configuration					Segment type				
Weaving number of lanes, N					Freeway				
Weaving segment length, L _s					Freeway minimum speed, S _{MIN}				
Freeway free-flow speed, FFS					Freeway maximum capacity, C _{IFL}				
Terrain type					Level				
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)
V _{FF}	2904	0.95	3	0	1.5	1.2	0.985	1.00	3103
V _{RF}	2376	0.92	2	0	1.5	1.2	0.990	1.00	2608
V _{FR}	506	0.92	2	0	1.5	1.2	0.990	1.00	556
V _{RR}	414	0.92	2	0	1.5	1.2	0.990	1.00	455
V _{NW}	6267							V =	6722
V _W	455								
VR	0.068								
Configuration Characteristics									
Minimum maneuver lanes, N _{WL}					Minimum weaving lane changes, LC _{MIN}				
Interchange density, ID					Weaving lane changes, LC _W				
Minimum RF lane changes, LC _{RF}					Non-weaving lane changes, LC _{NW}				
Minimum FR lane changes, LC _{FR}					Total lane changes, LC _{ALL}				
Minimum RR lane changes, LC _{RR}					Non-weaving vehicle index, I _{NW}				
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v					Weaving intensity factor, W				
Weaving segment capacity, c _w					Weaving segment speed, S				
Weaving segment v/c ratio					Average weaving speed, S _w				
Weaving segment density, D					Average non-weaving speed, S _{NW}				
Level of Service, LOS					Maximum weaving length, L _{MAX}				
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

BASIC FREEWAY SEGMENTS WORKSHEET			
General Information		Site Information	
Analyst		Highway/Direction of Travel	<i>I-95 NB</i>
Agency or Company	<i>AECOM</i>	From/To	<i>Seg 12-North of Hillsboro</i>
Date Performed		Jurisdiction	
Analysis Time Period	<i>PM</i>	Analysis Year	<i>2020 Build 2A</i>
Project Description <i>SW 10th Street SIMR</i>			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			
Flow Inputs			
Volume, V	<i>5280</i>	veh/h	Peak-Hour Factor, PHF <i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T <i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R <i>0</i>
Peak-Hr Direction Prop, D			General Terrain: <i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length <i>mi</i> Up/Down %
Calculate Flow Adjustments			
f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>
Speed Inputs		Calc Speed Adj and FFS	
Lane Width		ft	
Rt-Side Lat. Clearance		ft	f _{LW}
Number of Lanes, N	<i>4</i>		mph
Total Ramp Density, TRD		ramps/mi	f _{LC}
FFS (measured)	<i>70.0</i>	mph	TRD Adjustment
Base free-flow Speed, BFFS		mph	FFS
			<i>70.0</i>
			mph
LOS and Performance Measures		Design (N)	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v _p = (V or DDHV) / (PHF x N x f _{HV})		Design LOS	
	<i>1410</i>	pc/h/ln	v _p = (V or DDHV) / (PHF x N x f _{HV})
x f _p)			pc/h/ln
S	<i>69.5</i>	mph	x f _p)
D = v _p / S	<i>20.3</i>	pc/mi/ln	S
LOS	<i>C</i>		mph
			D = v _p / S
			pc/mi/ln
			Required Number of Lanes, N
Glossary		Factor Location	
N - Number of lanes	S - Speed	E _R - Exhibits 11-10, 11-12	f _{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9
v _p - Flow rate	FFS - Free-flow speed	f _p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v _p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 1-Bet Hillsboro & Palmetto*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4560</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1218* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *17.4* pc/mi/ln
 LOS *B*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst Agency/Company AECOM Date Performed Analysis Time Period AM					Freeway/Dir of Travel 195/SB Weaving Segment Location Seg 2-Bet On from Exp & Off Analysis Year 2020 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Weaving configuration Two-Sided Weaving number of lanes, N 4 Weaving segment length, L _s 3900ft Freeway free-flow speed, FFS 70 mph				Segment type Freeway Freeway minimum speed, S _{MIN} 15 Freeway maximum capacity, C _{IFL} 2400 Terrain type Level					
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)
V _{FF}	3470	0.95	3	0	1.5	1.2	0.985	1.00	3707
V _{RF}	970	0.92	2	0	1.5	1.2	0.990	1.00	1065
V _{FR}	1090	0.92	2	0	1.5	1.2	0.990	1.00	1197
V _{RR}	110	0.92	2	0	1.5	1.2	0.990	1.00	121
V _{NW}	5969							V =	6090
V _W	121								
VR	0.020								
Configuration Characteristics									
Minimum maneuver lanes, N _{WL} 0 lc				Minimum weaving lane changes, LC _{MIN} 363 lc/h					
Interchange density, ID 0.7 int/mi				Weaving lane changes, LC _W 935 lc/h					
Minimum RF lane changes, LC _{RF} 0 lc/pc				Non-weaving lane changes, LC _{NW} 2800 lc/h					
Minimum FR lane changes, LC _{FR} 0 lc/pc				Total lane changes, LC _{ALL} 3735 lc/h					
Minimum RR lane changes, LC _{RR} 3 lc/pc				Non-weaving vehicle index, I _{NW} 1630					
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v 6012 veh/h				Weaving intensity factor, W 0.218					
Weaving segment capacity, c _w 8851 veh/h				Weaving segment speed, S 60.1 mph					
Weaving segment v/c ratio 0.679				Average weaving speed, S _w 60.1 mph					
Weaving segment density, D 25.3 pc/mi/ln				Average non-weaving speed, S _{NW} 60.1 mph					
Level of Service, LOS C				Maximum weaving length, L _{MAX} 5911 ft					
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 3-Bet Off & On Ramp*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4440</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1581* pc/h/ln
 S *68.3* mph
 $D = v_p / S$ *23.1* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 4-Diverge to SW 10th St
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{up} = ft V _u = veh/h	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 4440 Ramp Volume, V_R 1440 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%;"> Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L_{down} = 2400 ft V_D = 1310 veh/h </td> </tr> </table>	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 4440 Ramp Volume, V _R 1440 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2400 ft V _D = 1310 veh/h
Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 4440 Ramp Volume, V _R 1440 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2400 ft V _D = 1310 veh/h		

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	4440	0.95	Level	3	0	0.985	1.00	4744
Ramp	1440	0.92	Level	2	0	0.990	1.00	1581
UpStream								
DownStream	1310	0.92	Level	2	0	0.990	1.00	1438

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.569 using Equation (Exhibit 13-7) V ₁₂ = 3380 pc/h V ₃ or V _{av34} 1364 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	4744	Exhibit 13-8	7200 No
				V _{FO} = V _F - V _R	3163	Exhibit 13-8	7200 No
				V _R	1581	Exhibit 13-10	2100 No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3380	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 31.5 (pc/mi/ln) LOS = D (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11)	D _s = 0.440 (Exhibit 13-12)
S _R = mph (Exhibit 13-11)	S _R = 57.7 mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-11)	S ₀ = 75.4 mph (Exhibit 13-12)
S = mph (Exhibit 13-13)	S = 61.8 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 5-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>3000</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1068* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *15.3* pc/mi/ln
 LOS *B*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 6-Merge from Hillsboro E&W
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs

Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A 300 Deceleration Lane Length L _D Freeway Volume, V _F 3000 Ramp Volume, V _R 1310 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 50.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
L _{up} = 2400 ft V _u = 1440 veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	3000	0.95	Level	3	0	0.985	1.00	3205
Ramp	1310	0.92	Level	2	0	0.990	1.00	1438
UpStream	1440	0.92	Level	2	0	0.990	1.00	1581
DownStream								

Merge Areas

Diverge Areas

Estimation of v₁₂

$V_{12} = V_F (P_{FM})$
 L_{EQ} = 1339.80 (Equation 13-6 or 13-7)
 P_{FM} = 0.586 using Equation (Exhibit 13-6)
 V₁₂ = 1878 pc/h
 V₃ or V_{av34} = 1327 pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = 1878 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v₁₂

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 L_{EQ} = (Equation 13-12 or 13-13)
 P_{FD} = using Equation (Exhibit 13-7)
 V₁₂ = pc/h
 V₃ or V_{av34} = pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}	4643	Exhibit 13-8	No	V _F		Exhibit 13-8	
				V _{FO} = V _F - V _R		Exhibit 13-8	
				V _R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V _{R12}	3316	Exhibit 13-8 4600:All	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V ₁₂		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 D_R = 28.8 (pc/mi/ln)
 LOS = D (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 D_R = (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

M_S = 0.398 (Exhibit 13-11)
 S_R = 58.8 mph (Exhibit 13-11)
 S₀ = 67.0 mph (Exhibit 13-11)
 S = 61.0 mph (Exhibit 13-13)

Speed Determination

D_s = (Exhibit 13-12)
 S_R = mph (Exhibit 13-12)
 S₀ = mph (Exhibit 13-12)
 S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 7-Bet On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4310</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1535* pc/h/ln
 S *68.7* mph
 $D = v_p / S$ *22.3* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume

S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

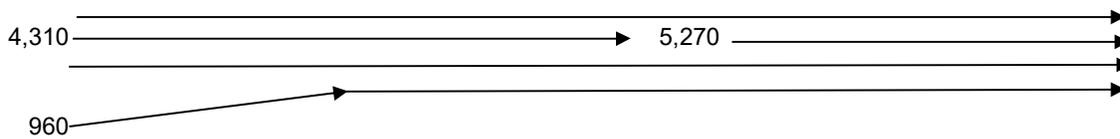
Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 8: I-95 Southbound On-Ramp from SW 10th Street EB & WB
Analysis Period: AM Peak Hour
Analysis Year: 2020 Build 2A



	PHF =	0.95	
	v_{fr} =	5,270	vph
	v_r =	960	vph
	v_f =	4,310	
Upstream Freeway	Tr % =	3%	
Ramp	Tr % =	2%	
Downstream Freeway	Tr % =	3%	
Freeway	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.985</u>
Ramp	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.9901</u>
flat terrain	E_T =	1.5	
	RV % =	0	
Driver Population adj.	f_p =	1.000	
	V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_p) =$	5,631 pc/h
	V_r =	$=v_r/(PHF)(f_{HV})(f_p) =$	1,021 pc/h
	V_f =	$=v_f/(PHF)(f_{HV})(f_p) =$	4,605 pc/h
No. lanes upstream of ramp	N =	3	

No. Ln	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	5,631	0.59	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	4,605	0.64	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,021	0.49	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 9-Bet 10th & Exit to Exp*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>5270</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1408* pc/h/ln
 S *69.5* mph
 $D = v_p / S$ *20.3* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 10-Merge from Ex to GP
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build 2A
Project Description SW 10th Street SIMR			

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off $L_{up} =$ ft $V_u =$ veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A 600 Deceleration Lane Length L_D Freeway Volume, V_F 5270 Ramp Volume, V_R 320 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off $L_{down} =$ 1150 ft $V_D =$ 620 veh/h
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Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5270	0.95	Level	3	0	0.985	1.00	5631
Ramp	320	0.92	Level	2	0	0.990	1.00	351
UpStream								
DownStream	620	0.92	Level	2	0	0.990	1.00	681

Merge Areas

Diverge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 $L_{EQ} =$
 $P_{FM} =$ 0.174 using Equation (Exhibit 13-6)
 $V_{12} =$ 979 pc/h
 V_3 or V_{av34} 2326 pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ 2252 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 $L_{EQ} =$
 $P_{FD} =$ using Equation (Exhibit 13-7)
 $V_{12} =$ pc/h
 V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}	5982	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V_F		Exhibit 13-8	
$V_{FO} = V_F - V_R$		Exhibit 13-8	
V_R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	2603	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 $D_R =$ 21.9 (pc/mi/ln)
 LOS = C (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 $D_R =$ (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

$M_S =$ 0.314 (Exhibit 13-11)
 $S_R =$ 61.2 mph (Exhibit 13-11)
 $S_0 =$ 65.7 mph (Exhibit 13-11)
 $S =$ 63.7 mph (Exhibit 13-13)

Speed Determination

$D_s =$ (Exhibit 13-12)
 $S_R =$ mph (Exhibit 13-12)
 $S_0 =$ mph (Exhibit 13-12)
 $S =$ mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 11- Diverge to Express
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 1150 ft V _u = 320 veh/h	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 5590 Ramp Volume, V_R 620 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%;"> Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L_{down} = ft V_D = veh/h </td> </tr> </table>	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 5590 Ramp Volume, V _R 620 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 5590 Ramp Volume, V _R 620 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h		

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	5590	0.95	Level	3	0	0.985	1.00	5972
Ramp	620	0.92	Level	2	0	0.990	1.00	681
UpStream	320	0.92	Level	2	0	0.990	1.00	351
DownStream								

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 2988 pc/h V ₃ or V _{av34} 1492 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	5972	Exhibit 13-8	9600 No
				V _{FO} = V _F - V _R	5291	Exhibit 13-8	9600 No
				V _R	681	Exhibit 13-10	2100 No

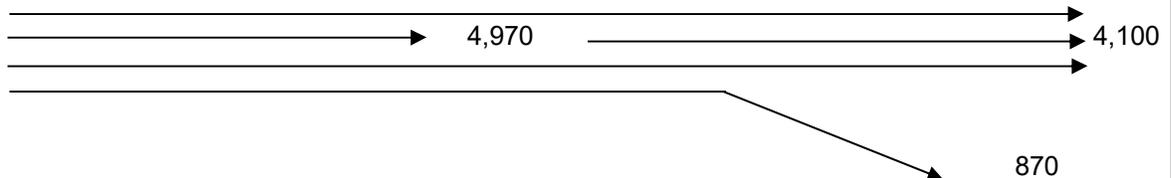
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	2988	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 30.7 (pc/mi/ln) LOS = D (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)	D _s = 0.359 (Exhibit 13-12) S _R = 59.9 mph (Exhibit 13-12) S ₀ = 75.5 mph (Exhibit 13-12) S = 66.0 mph (Exhibit 13-13)

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 12: I-95 SB Off-Ramp to Sample Road EB & WB
Analysis Period: AM Peak Hour
Analysis Year: 2020 Build 2A



PHF =	0.95	
$v_{fr} =$	4,970	vph
$v_r =$	870	vph
$v_f =$	4,100	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.985</u>
Ramp $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.9901</u>
flat terrain $E_T =$	1.5	
RV % =	0	
Driver Population adj. $f_P =$	1.000	
$V_{fr} =$	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	5,310 pc/h
$V_r =$	$=v_r/(PHF)(f_{HV})(f_P) =$	925 pc/h
$V_f =$	$=v_f/(PHF)(f_{HV})(f_P) =$	4,381 pc/h
No. lanes upstream of ramp $N =$	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

$D = 0.0175 (V_{fr}/N) = 23.2 \text{ pc/ln}$

LOS in the Diverge Area (from Density and Exhibit 13-2) =

C

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	5,310	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	4,381	No
1	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	2,100	925	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 13-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4100</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1460* pc/h/ln
 S *69.2* mph
 $D = v_p / S$ *21.1* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume

S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency/Company	AECOM	Weaving Segment Location	Seg 14- Bet Sample & Copans
Date Performed		Analysis Year	2020 Build 2A
Analysis Time Period	AM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2520ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3485	0.95	3	0	1.5	1.2	0.985	1.00	3723
V_{RF}	1770	0.92	2	0	1.5	1.2	0.990	1.00	1943
V_{FR}	615	0.92	2	0	1.5	1.2	0.990	1.00	675
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	3723							V =	6341
V_W	2618								
VR	0.413								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	6261 veh/h	Weaving intensity factor, W	
Weaving segment capacity, c_w	5727 veh/h	Weaving segment speed, S	mph
Weaving segment v/c ratio	1.093	Average weaving speed, S_W	mph
Weaving segment density, D	pc/mi/ln	Average non-weaving speed, S_{NW}	mph
Level of Service, LOS	F	Maximum weaving length, L_{MAX}	6826 ft

Notes

- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 1-Bet Hillsboro & Palmetto*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4530</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1210* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *17.3* pc/mi/ln
 LOS *B*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst Agency/Company AECOM Date Performed Analysis Time Period PM					Freeway/Dir of Travel 195/SB Weaving Segment Location Seg 2-Bet On from Exp & Off Analysis Year 2020 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Weaving configuration Two-Sided Weaving number of lanes, N 4 Weaving segment length, L _s 3900ft Freeway free-flow speed, FFS 70 mph					Segment type Freeway Freeway minimum speed, S _{MIN} 15 Freeway maximum capacity, C _{IFL} 2400 Terrain type Level				
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)
V _{FF}	3600	0.95	3	0	1.5	1.2	0.985	1.00	3846
V _{RF}	970	0.92	2	0	1.5	1.2	0.990	1.00	1065
V _{FR}	930	0.92	2	0	1.5	1.2	0.990	1.00	1021
V _{RR}	110	0.92	2	0	1.5	1.2	0.990	1.00	121
V _{NW}	5932							V =	6053
V _W	121								
VR	0.020								
Configuration Characteristics									
Minimum maneuver lanes, N _{WL} 0 lc					Minimum weaving lane changes, LC _{MIN} 363 lc/h				
Interchange density, ID 0.7 int/mi					Weaving lane changes, LC _W 935 lc/h				
Minimum RF lane changes, LC _{RF} 0 lc/pc					Non-weaving lane changes, LC _{NW} 2785 lc/h				
Minimum FR lane changes, LC _{FR} 0 lc/pc					Total lane changes, LC _{ALL} 3720 lc/h				
Minimum RR lane changes, LC _{RR} 3 lc/pc					Non-weaving vehicle index, I _{NW} 1619				
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v 5975 veh/h					Weaving intensity factor, W 0.218				
Weaving segment capacity, c _w 8851 veh/h					Weaving segment speed, S 60.1 mph				
Weaving segment v/c ratio 0.675					Average weaving speed, S _w 60.2 mph				
Weaving segment density, D 25.2 pc/mi/ln					Average non-weaving speed, S _{NW} 60.1 mph				
Level of Service, LOS C					Maximum weaving length, L _{MAX} 5912 ft				
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 3-Bet Off & On Ramp*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4570</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1628* pc/h/ln
 S *67.9* mph
 $D = v_p / S$ *24.0* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 5-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	3360	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P _T	3
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1197* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *17.1* pc/mi/ln
 LOS *B*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume

S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 6-Merge from Hillsboro E&W
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build 2A
Project Description SW 10th Street SIMR			

Inputs

Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A 300 Deceleration Lane Length L _D Freeway Volume, V _F 3360 Ramp Volume, V _R 1470 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 50.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
L _{up} = 2400 ft V _u = 1210 veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	3360	0.95	Level	3	0	0.985	1.00	3590
Ramp	1470	0.92	Level	2	0	0.990	1.00	1614
UpStream	1210	0.92	Level	2	0	0.990	1.00	1328
DownStream								

Merge Areas	Diverge Areas
-------------	---------------

Estimation of v₁₂

$V_{12} = V_F (P_{FM})$ L _{EQ} = 1459.86 (Equation 13-6 or 13-7) P _{FM} = 0.586 using Equation (Exhibit 13-6) V ₁₂ = 2103 pc/h V ₃ or V _{av34} = 1487 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = 2103 pc/h (Equation 13-16, 13-18, or 13-19)
--

Estimation of v₁₂

$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)
--

Capacity Checks

	Actual	Capacity	LOS F?
V _{FO}	5204	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V _F		Exhibit 13-8	
V _{FO} = V _F - V _R		Exhibit 13-8	
V _R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V _{R12}	3717	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V ₁₂		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 31.8 (pc/mi/ln) LOS = D (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)
--

Speed Determination

M _S = 0.451 (Exhibit 13-11)
S _R = 57.4 mph (Exhibit 13-11)
S ₀ = 66.4 mph (Exhibit 13-11)
S = 59.7 mph (Exhibit 13-13)

Speed Determination

D _s = (Exhibit 13-12)
S _R = mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 7-Bet On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	4830	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P _T	3
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N 3
 Total Ramp Density, TRD ramps/mi
 FFS (measured) 70.0 mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS 70.0 mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ 1720 pc/h/ln
 S 66.9 mph
 $D = v_p / S$ 25.7 pc/mi/ln
 LOS C

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

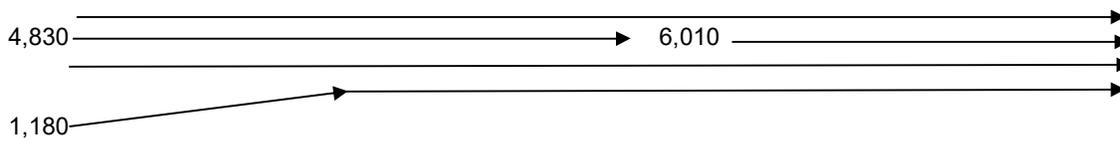
N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 8: I-95 Southbound On-Ramp from SW 10th Street EB & WB
Analysis Period: PM Peak Hour
Analysis Year: 2020 Build 3



	PHF =	0.95	
	v_{fr} =	6,010	vph
	v_r =	1,180	vph
	v_f =	4,830	
Upstream Freeway	Tr % =	3%	
Ramp	Tr % =	2%	
Downstream Freeway	Tr % =	3%	
Freeway	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain	E_T =	1.5	
	RV % =	0	
Driver Population adj.	f_P =	1.000	
	V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	6,421 pc/h
	V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,255 pc/h
	V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	5,160 pc/h
No. lanes upstream of ramp	N =	3	

No. Ln	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,421	0.67	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,160	0.72	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,255	0.60	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 9-Bet 10th & Exit to Exp*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>6010</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1605* pc/h/ln
 S *68.1* mph
 $D = v_p / S$ *23.6* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 10-Merge from Ex to GP
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build 2A
Project Description SW 10th Street SIMR			

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A 600 Deceleration Lane Length L _D Freeway Volume, V _F 6010 Ramp Volume, V _R 300 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off L _{down} = 1150 ft V _D = 670 veh/h
L _{up} = ft		
V _u = veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6010	0.95	Level	3	0	0.985	1.00	6421
Ramp	300	0.92	Level	2	0	0.990	1.00	329
UpStream								
DownStream	670	0.92	Level	2	0	0.990	1.00	736

Merge Areas

Diverge Areas

Estimation of v₁₂

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 L_{EQ} =
 P_{FM} = 0.177 using Equation (Exhibit 13-6)
 V₁₂ = 1134 pc/h
 V₃ or V_{av34} = 2643 pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = 2568 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v₁₂

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 L_{EQ} =
 P_{FD} = using Equation (Exhibit 13-7)
 V₁₂ = pc/h
 V₃ or V_{av34} = pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?
V _{FO}	6750	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V _F		Exhibit 13-8	
V _{FO} = V _F - V _R		Exhibit 13-8	
V _R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V _{R12}	2897	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V ₁₂		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 D_R = 24.2 (pc/mi/ln)
 LOS = C (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 D_R = (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

M_S = 0.332 (Exhibit 13-11)
 S_R = 60.7 mph (Exhibit 13-11)
 S₀ = 64.9 mph (Exhibit 13-11)
 S = 63.0 mph (Exhibit 13-13)

Speed Determination

D_s = (Exhibit 13-12)
 S_R = mph (Exhibit 13-12)
 S₀ = mph (Exhibit 13-12)
 S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 11- Diverge to Express
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build 2A

Project Description SW 10th Street SIMR

Inputs		
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 1150 ft V _u = 300 veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6310 Ramp Volume, V _R 670 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6310	0.95	Level	3	0	0.985	1.00	6742
Ramp	670	0.92	Level	2	0	0.990	1.00	736
UpStream	300	0.92	Level	2	0	0.990	1.00	329
DownStream								

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 3355 pc/h V ₃ or V _{av34} 1693 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	6742	Exhibit 13-8	9600 No
				V _{FO} = V _F - V _R	6006	Exhibit 13-8	9600 No
				V _R	736	Exhibit 13-10	2100 No

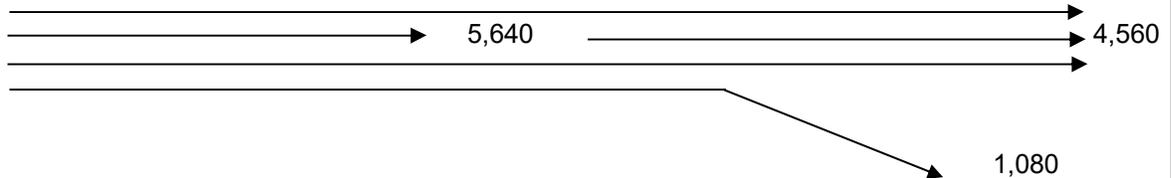
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3355	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 34.2 (pc/mi/ln) LOS = D (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)	D _s = 0.364 (Exhibit 13-12) S _R = 59.8 mph (Exhibit 13-12) S ₀ = 74.7 mph (Exhibit 13-12) S = 65.7 mph (Exhibit 13-13)

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 12: I-95 SB Off-Ramp to Sample Road EB & WB
Analysis Period: PM Peak Hour
Analysis Year: 2020 Build 2A



PHF =	0.95	
v_{fr} =	5,640	vph
v_r =	1,080	vph
v_f =	4,560	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	6,026 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,148 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	4,872 pc/h
No. lanes upstream of ramp N =	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

$D = 0.0175 (V_{fr}/N) = 26.4 \text{ pc/ln}$

LOS in the Diverge Area (from Density and Exhibit 13-2) =

C

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	6,026	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	4,872	No
1	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	2,100	1,148	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 13-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2020 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4560</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1624* pc/h/ln
 S *67.9* mph
 $D = v_p / S$ *23.9* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency/Company	AECOM	Weaving Segment Location	Seg 14- Bet Sample & Copans
Date Performed		Analysis Year	2020 Build 2A
Analysis Time Period	PM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2520ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3915	0.95	3	0	1.5	1.2	0.985	1.00	4183
V_{RF}	1380	0.92	2	0	1.5	1.2	0.990	1.00	1515
V_{FR}	645	0.92	2	0	1.5	1.2	0.990	1.00	708
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	4183							V =	6406
V_W	2223								
VR	0.347								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	2223 lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	2672 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1457 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	4129 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	738

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	6323 veh/h	Weaving intensity factor, W	0.334
Weaving segment capacity, c_w	6814 veh/h	Weaving segment speed, S	49.3 mph
Weaving segment v/c ratio	0.928	Average weaving speed, S_W	56.2 mph
Weaving segment density, D	32.5 pc/mi/ln	Average non-weaving speed, S_{NW}	46.3 mph
Level of Service, LOS	D	Maximum weaving length, L_{MAX}	6094 ft

Notes

- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst		Freeway/Dir of Travel			I-95 NB Express Lane					
Agency or Company		AECOM			Junction					
Date Performed					Off to SW 10th Connector					
Analysis Time Period		AM			Jurisdiction					
					Analysis Year					
					2020 Build 2A					
Project Description SW 10th Street SIMR										
Inputs										
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D			345			L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1240			V _D = veh/h		
		Ramp Volume, V _R			180					
		Freeway Free-Flow Speed, S _{FF}			70.0					
		Ramp Free-Flow Speed, S _{FR}			60.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p		
Freeway	1240	0.95	Level	3	0	0.985	1.00	1325		
Ramp	180	0.95	Level	2	0	0.990	1.00	191		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v₁₂					Estimation of v₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 1325 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}		Exhibit 13-8			V _F	1325	Exhibit 13-8		4800	No
					V _{FO} = V _F - V _R	1134	Exhibit 13-8		4800	No
					V _R	191	Exhibit 13-10		2200	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}		Exhibit 13-8			V ₁₂	1325	Exhibit 13-8		4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 12.5 (pc/mi/ln) LOS = B (Exhibit 13-2)					
Speed Determination					Speed Determination					
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D _S = 0.120 (Exhibit 13-12) S _R = 66.6 mph (Exhibit 13-12) S ₀ = N/A mph (Exhibit 13-12) S = 66.6 mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 NB Express Lanes				
Agency or Company		AECOM			Junction				
Date Performed					On from SW 10th St. Connector				
Analysis Time Period		AM			Jurisdiction				
Project Description		SW 10th Street SIMR			Analysis Year				
					2020 Build 2A				
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1040		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D					L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1060		V _D = veh/h		
		Ramp Volume, V _R			1120				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1060	0.95	Level	3	0	0.985	1.00	1133	
Ramp	1120	0.95	Level	2	0	0.990	1.00	1191	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1133 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	2324	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	2459	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 16.5 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.242 (Exhibit 13-11) S _R = 63.2 mph (Exhibit 13-11) S ₀ = N/A mph (Exhibit 13-11) S = 63.2 mph (Exhibit 13-13)					D _S = (Exhibit 13-12) S _R = mph (Exhibit 13-12) S ₀ = mph (Exhibit 13-12) S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lane				
Agency or Company		AECOM			Junction				
Date Performed					Off to SW 10th Connector				
Analysis Time Period		AM			Jurisdiction				
					Analysis Year				
					2020 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Deceleration Lane Length L _D			250			L _{down} = ft	
V _u = veh/h		Freeway Volume, V _F			1110			V _D = veh/h	
		Ramp Volume, V _R			510				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1110	0.95	Level	3	0	0.985	1.00	1186	
Ramp	510	0.95	Level	2	0	0.990	1.00	542	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)				
L _{EQ} =					L _{EQ} =				
P _{FM} = using Equation (Exhibit 13-6)					P _{FD} = 1.000 using Equation (Exhibit 13-7)				
V ₁₂ = pc/h					V ₁₂ = 1186 pc/h				
V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17)					V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17)				
Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No					Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No					Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	1186	Exhibit 13-8	4800	No
			V _{FO} = V _F - V _R		644	Exhibit 13-8	4800	No	
			V _R		542	Exhibit 13-10	2200	No	
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	1186	Exhibit 13-8	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
D _R = 5.475 + 0.00734 v _R + 0.0078 V ₁₂ - 0.00627 L _A					D _R = 4.252 + 0.0086 V ₁₂ - 0.009 L _D				
D _R = (pc/mi/ln)					D _R = 12.2 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = B (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = (Exhibit 13-11)					D _S = 0.152 (Exhibit 13-12)				
S _R = mph (Exhibit 13-11)					S _R = 65.8 mph (Exhibit 13-12)				
S ₀ = mph (Exhibit 13-11)					S ₀ = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 65.8 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lanes				
Agency or Company		AECOM			Junction				
Date Performed					On from SW 10th St. Connector				
Analysis Time Period		AM			Jurisdiction				
Project Description		SW 10th Street SIMR			Analysis Year				
					2020 Build 2A				
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1100			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Deceleration Lane Length L _D						L _{down} = ft	
V _u = veh/h		Freeway Volume, V _F			600			V _D = veh/h	
		Ramp Volume, V _R			330				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	600	0.95	Level	3	0	0.985	1.00	641	
Ramp	330	0.95	Level	2	0	0.990	1.00	351	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EO} = P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 641 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EO} = P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	992	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	1068	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 6.2 (pc/mi/ln) LOS = A (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.200 (Exhibit 13-11)					D _S = (Exhibit 13-12)				
S _R = 64.4 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)				
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)				
S = 64.4 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst		Freeway/Dir of Travel			I-95 NB Express Lane					
Agency or Company		AECOM			Junction					
Date Performed					Off to SW 10th Connector					
Analysis Time Period		PM			Jurisdiction					
					Analysis Year					
					2020 Build 2A					
Project Description SW 10th Street SIMR										
Inputs										
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D			345			L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1040			V _D = veh/h		
		Ramp Volume, V _R			390					
		Freeway Free-Flow Speed, S _{FF}			70.0					
		Ramp Free-Flow Speed, S _{FR}			60.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p		
Freeway	1040	0.95	Level	3	0	0.985	1.00	1111		
Ramp	390	0.95	Level	2	0	0.990	1.00	415		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v₁₂					Estimation of v₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 1111 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}		Exhibit 13-8			V _F	1111	Exhibit 13-8		4800	No
					V _{FO} = V _F - V _R	696	Exhibit 13-8		4800	No
					V _R	415	Exhibit 13-10		2200	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}		Exhibit 13-8			V ₁₂	1111	Exhibit 13-8		4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 10.7 (pc/mi/ln) LOS = B (Exhibit 13-2)					
Speed Determination					Speed Determination					
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D _S = 0.140 (Exhibit 13-12) S _R = 66.1 mph (Exhibit 13-12) S ₀ = N/A mph (Exhibit 13-12) S = 66.1 mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 NB Express Lanes				
Agency or Company		AECOM			Junction				
Date Performed		Jurisdiction			On from SW 10th St. Connector				
Analysis Time Period		PM			Analysis Year				
					2020 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1040		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D					L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			650		V _D = veh/h		
		Ramp Volume, V _R			580				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	650	0.95	Level	3	0	0.985	1.00	694	
Ramp	580	0.95	Level	2	0	0.990	1.00	617	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)				
L _{EO} = 1.000 using Equation (Exhibit 13-6)					L _{EO} = using Equation (Exhibit 13-7)				
P _{FM} = 694 pc/h					P _{FD} = pc/h				
V ₁₂ = 694 pc/h					V ₁₂ = pc/h				
V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17)					V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17)				
Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No				
If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	1311	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	1394	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 8.9 (pc/mi/ln)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln)				
LOS = A (Exhibit 13-2)					LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.212 (Exhibit 13-11)					D _S = (Exhibit 13-12)				
S _R = 64.1 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)				
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)				
S = 64.1 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lane				
Agency or Company		AECOM			Junction				
Date Performed					Off to SW 10th Connector				
Analysis Time Period		PM			Jurisdiction				
					Analysis Year				
					2020 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A					<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D			250		L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1970		V _D = veh/h		
		Ramp Volume, V _R			760				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1970	0.95	Level	3	0	0.985	1.00	2105	
Ramp	760	0.95	Level	2	0	0.990	1.00	808	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 2105 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	2105	Exhibit 13-8	4800	No
			V _{FO} = V _F - V _R	1297	Exhibit 13-8	4800	No		
			V _R	808	Exhibit 13-10	2200	No		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	2105	Exhibit 13-8	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 20.1 (pc/mi/ln) LOS = C (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D _S = 0.176 (Exhibit 13-12) S _R = 65.1 mph (Exhibit 13-12) S ₀ = N/A mph (Exhibit 13-12) S = 65.1 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lanes				
Agency or Company		AECOM			Junction				
Date Performed		Jurisdiction			On from SW 10th St. Connector				
Analysis Time Period		PM			Analysis Year				
					2020 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1100		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D					L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1210		V _D = veh/h		
		Ramp Volume, V _R			170				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1210	0.95	Level	3	0	0.985	1.00	1293	
Ramp	170	0.95	Level	2	0	0.990	1.00	181	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)				
L _{EO} = 1.000 using Equation (Exhibit 13-6)					L _{EO} = using Equation (Exhibit 13-7)				
P _{FM} = 1.000 using Equation (Exhibit 13-6)					P _{FD} = using Equation (Exhibit 13-7)				
V ₁₂ = 1293 pc/h					V ₁₂ = pc/h				
V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17)					V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17)				
Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No				
If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	1474	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	1629	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 10.0 (pc/mi/ln)					$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln)				
LOS = A (Exhibit 13-2)					LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.209 (Exhibit 13-11)					D _S = (Exhibit 13-12)				
S _R = 64.2 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)				
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)				
S = 64.2 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 NB CD				
Agency or Company		AECOM			Junction				
Date Performed					N. of Hillsboro Blvd.				
Analysis Time Period		AM			Jurisdiction				
Project Description		SW 10th Street SIMR			Analysis Year				
					2020 Build 2A				
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			890			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Deceleration Lane Length L _D						L _{down} = ft	
V _u = veh/h		Freeway Volume, V _F			1220			V _D = veh/h	
		Ramp Volume, V _R			710				
		Freeway Free-Flow Speed, S _{FF}			55.0				
		Ramp Free-Flow Speed, S _{FR}			40.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1220	0.95	Level	3	0	0.985	1.00	1303	
Ramp	710	0.95	Level	2	0	0.990	1.00	755	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ L _{EO} = (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1303 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EO} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	2058	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	2058	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 15.6 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.280 (Exhibit 13-11)					D _S = (Exhibit 13-12)				
S _R = 51.4 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)				
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)				
S = 51.4 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst		Freeway/Dir of Travel			I-95 NB CD					
Agency or Company		AECOM			Junction					N. of Hillsboro Blvd.
Date Performed		Jurisdiction								
Analysis Time Period		PM			Analysis Year					2020 Build 2A
Project Description SW 10th Street SIMR										
Inputs										
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp			
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On			
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			890		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off			
L _{up} = ft		Deceleration Lane Length L _D					L _{down} = ft			
V _u = veh/h		Freeway Volume, V _F			1515		V _D = veh/h			
		Ramp Volume, V _R			620					
		Freeway Free-Flow Speed, S _{FF}			55.0					
		Ramp Free-Flow Speed, S _{FR}			40.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p		
Freeway	1515	0.95	Level	3	0	0.985	1.00	1619		
Ramp	620	0.95	Level	2	0	0.990	1.00	659		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v ₁₂					Estimation of v ₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1619 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}	2278	Exhibit 13-8		No	V _F		Exhibit 13-8			
					V _{FO} = V _F - V _R		Exhibit 13-8			
					V _R		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}	2278	Exhibit 13-8		No	V ₁₂		Exhibit 13-8			
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 17.4 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					
Speed Determination					Speed Determination					
M _S = 0.288 (Exhibit 13-11) S _R = 51.3 mph (Exhibit 13-11) S ₀ = N/A mph (Exhibit 13-11) S = 51.3 mph (Exhibit 13-13)					D _S = (Exhibit 13-12) S _R = mph (Exhibit 13-12) S ₀ = mph (Exhibit 13-12) S = mph (Exhibit 13-13)					

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency/Company	AECOM	Weaving Segment Location	Seg 1-Bet Copans & Sample
Date Performed		Analysis Year	2040 Build 2A
Analysis Time Period	AM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2380ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4420	0.95	3	0	1.5	1.2	0.985	1.00	4722
V_{RF}	420	0.92	2	0	1.5	1.2	0.990	1.00	461
V_{FR}	980	0.92	2	0	1.5	1.2	0.990	1.00	1076
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	4722							V =	6259
V_W	1537								
VR	0.246								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	1537 lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	1972 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1492 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	3464 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	787

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	6175 veh/h	Weaving intensity factor, W	0.304
Weaving segment capacity, c_w	8666 veh/h	Weaving segment speed, S	52.7 mph
Weaving segment v/c ratio	0.712	Average weaving speed, S_W	57.2 mph
Weaving segment density, D	29.7 pc/mi/ln	Average non-weaving speed, S_{NW}	51.4 mph
Level of Service, LOS	D	Maximum weaving length, L_{MAX}	5007 ft

Notes

- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 2-Bet Off & On from Sample*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4840</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LV} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1724* pc/h/ln
 S *66.8* mph
 $D = v_p / S$ *25.8* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

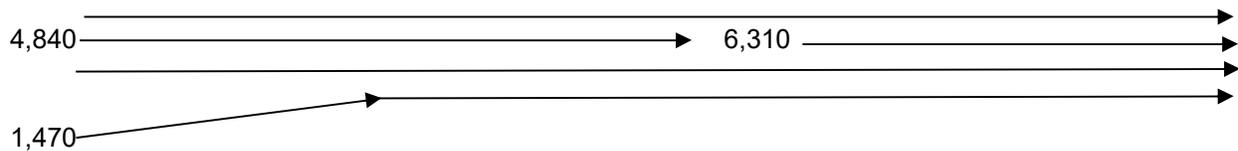
N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LV} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 3: I-95 Northbound On-Ramp from WB Sample Road
Analysis Period: AM Peak Hour
Analysis Year: 2040 Build 2A



PHF =	0.95	
$V_{fr} =$	6,310	vph
$V_r =$	1,470	vph
$V_f =$	4,840	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.985</u>
Ramp $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.9901</u>
flat terrain $E_T =$	1.5	
RV % =	0	
Driver Population adj. $f_P =$	1.000	
$V_{fr} =$	$=V_r/(PHF)(f_{HV})(f_P) =$	6,742 pc/h
$V_r =$	$=V_r/(PHF)(f_{HV})(f_P) =$	1,563 pc/h
$V_f =$	$=V_f/(PHF)(f_{HV})(f_P) =$	5,171 pc/h
No. lanes upstream of ramp $N =$	3	

<u>No. Ln</u>	<u>Capacity Check (see Exhibits 25-3 and 25-7):</u>	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,742	0.70	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,171	0.72	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,563	0.74	No

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 4-On from Exp
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040 Build 2A
Project Description SW 10th Street SIMR			

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{up} = ft V _u = veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A 1500 Deceleration Lane Length L _D Freeway Volume, V _F 6310 Ramp Volume, V _R 860 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off L _{down} = 2950 ft V _D = 310 veh/h
--	--	--

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6310	0.95	Level	3	0	0.985	1.00	6742
Ramp	860	0.92	Level	2	0	0.990	1.00	944
UpStream								
DownStream	310	0.92	Level	2	0	0.990	1.00	340

Merge Areas

Diverge Areas

Estimation of v₁₂

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 L_{EQ} =
 P_{FM} = 0.100 using Equation (Exhibit 13-6)
 V₁₂ = 673 pc/h
 V₃ or V_{av34} = 3034 pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = 2696 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v₁₂

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 L_{EQ} =
 P_{FD} = using Equation (Exhibit 13-7)
 V₁₂ = pc/h
 V₃ or V_{av34} = pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?
V _{FO}	7686	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V _F		Exhibit 13-8	
V _{FO} = V _F - V _R		Exhibit 13-8	
V _R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V _{R12}	3963	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V ₁₂		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 D_R = 28.2 (pc/mi/ln)
 LOS = D (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 D_R = (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

M_S = 0.376 (Exhibit 13-11)
 S_R = 59.5 mph (Exhibit 13-11)
 S₀ = 65.5 mph (Exhibit 13-11)
 S = 62.1 mph (Exhibit 13-13)

Speed Determination

D_s = (Exhibit 13-12)
 S_R = mph (Exhibit 13-12)
 S₀ = mph (Exhibit 13-12)
 S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 5-Off to Exp from GPL
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs		
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 2950 ft V _u = 860 veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 7170 Ramp Volume, V _R 310 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	7170	0.95	Level	3	0	0.985	1.00	7661
Ramp	310	0.92	Level	2	0	0.990	1.00	340
UpStream	860	0.92	Level	2	0	0.990	1.00	944
DownStream								

Merge Areas	Diverge Areas
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Estimation of v ₁₂	Estimation of v ₁₂
$V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 3532 pc/h V ₃ or V _{av34} 2064 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?		
V _{FO}		V _F	7661	Exhibit 13-8	9600	No
		V _{FO} = V _F - V _R	7321	Exhibit 13-8	9600	No
		V _R	340	Exhibit 13-10	2100	No

Flow Entering Merge Influence Area	Flow Entering Diverge Influence Area
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	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?	
V _{R12}		Exhibit 13-8		V ₁₂	3532	Exhibit 13-8	4400:All	No

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

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 32.8 (pc/mi/ln) LOS = D (Exhibit 13-2)
--	---

Speed Determination	Speed Determination
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M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)	D _s = 0.329 (Exhibit 13-12) S _R = 60.8 mph (Exhibit 13-12) S ₀ = 72.6 mph (Exhibit 13-12) S = 66.7 mph (Exhibit 13-13)
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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 6-South of Off to 10th*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>6860</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1832* pc/h/ln
 S *65.4* mph
 $D = v_p / S$ *28.0* pc/mi/ln
 LOS *D*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume

S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

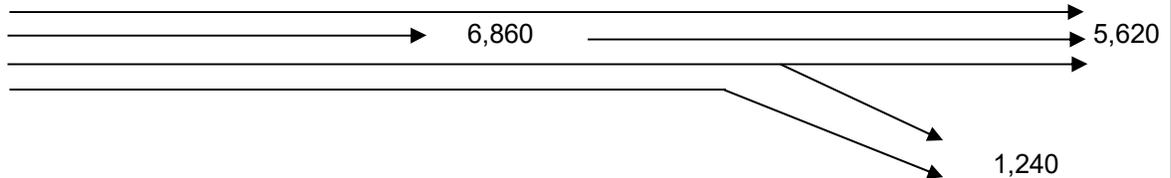
Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 7: I-95 NB Off-Ramp to SW 10th St EB & WB
Analysis Period: AM Peak Hour
Analysis Year: 2040 Build 2A



PHF =	0.95	
v_{fr} =	6,860	vph
v_r =	1,240	vph
v_f =	5,620	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	7,329 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,318 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	6,005 pc/h
No. lanes upstream of ramp N =	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

D = 0.0175 (V_{fr}/N) = 32.1 pc/ln

LOS in the Diverge Area (from Density and Exhibit 13-2) =

D

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	7,329	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	6,005	No
2	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	4,200	1,318	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 8-Bet Off & Off Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>5620</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ 2002 pc/h/ln
 S *62.5* mph
 $D = v_p / S$ *32.0* pc/mi/ln
 LOS *D*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 9-Off to Hillsboro EB&WB
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{up} = ft V _u = veh/h	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 5620 Ramp Volume, V_R 1370 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%;"> Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L_{down} = 2100 ft V_D = 1640 veh/h </td> </tr> </table>	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 5620 Ramp Volume, V _R 1370 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2100 ft V _D = 1640 veh/h
Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 5620 Ramp Volume, V _R 1370 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2100 ft V _D = 1640 veh/h		

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	5620	0.95	Level	3	0	0.985	1.00	6005
Ramp	1370	0.92	Level	2	0	0.990	1.00	1504
UpStream								
DownStream	1640	0.92	Level	2	0	0.990	1.00	1800

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.541 using Equation (Exhibit 13-7) V ₁₂ = 3938 pc/h V ₃ or V _{av34} 2067 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	6005	Exhibit 13-8	7200 No
				V _{FO} = V _F - V _R	4501	Exhibit 13-8	7200 No
				V _R	1504	Exhibit 13-10	2100 No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3938	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 36.3 (pc/mi/ln) LOS = E (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11)	D _s = 0.433 (Exhibit 13-12)
S _R = mph (Exhibit 13-11)	S _R = 57.9 mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-11)	S ₀ = 72.6 mph (Exhibit 13-12)
S = mph (Exhibit 13-13)	S = 62.2 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 10-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4250</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1514* pc/h/ln
 S *68.9* mph
 $D = v_p / S$ *22.0* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst					Freeway/Dir of Travel				
Agency/Company AECOM					I-95 NB				
Date Performed					Weaving Segment Location				
Analysis Time Period AM					2040 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Weaving configuration Two-Sided					Segment type				
Weaving number of lanes, N 4					Freeway				
Weaving segment length, L _S 2970ft					Freeway minimum speed, S _{MIN} 15				
Freeway free-flow speed, FFS 70 mph					Freeway maximum capacity, C _{IFL} 2400				
					Terrain type Level				
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)
V _{FF}	3639	0.95	3	0	1.5	1.2	0.985	1.00	3888
V _{RF}	2551	0.92	2	0	1.5	1.2	0.990	1.00	2801
V _{FR}	611	0.92	2	0	1.5	1.2	0.990	1.00	671
V _{RR}	429	0.92	2	0	1.5	1.2	0.990	1.00	471
V _{NW}	7360							V =	7831
V _W	471								
VR	0.060								
Configuration Characteristics									
Minimum maneuver lanes, N _{WL} 0 lc					Minimum weaving lane changes, LC _{MIN} 1413 lc/h				
Interchange density, ID 0.7 int/mi					Weaving lane changes, LC _W 1906 lc/h				
Minimum RF lane changes, LC _{RF} 0 lc/pc					Non-weaving lane changes, LC _{NW} 2701 lc/h				
Minimum FR lane changes, LC _{FR} 0 lc/pc					Total lane changes, LC _{ALL} 4607 lc/h				
Minimum RR lane changes, LC _{RR} 3 lc/pc					Non-weaving vehicle index, I _{NW} 1530				
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v 7734 veh/h					Weaving intensity factor, W 0.320				
Weaving segment capacity, c _w 8457 veh/h					Weaving segment speed, S 50.8 mph				
Weaving segment v/c ratio 0.914					Average weaving speed, S _w 56.7 mph				
Weaving segment density, D 38.6 pc/mi/ln					Average non-weaving speed, S _{NW} 50.4 mph				
Level of Service, LOS E					Maximum weaving length, L _{MAX} 6289 ft				
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

BASIC FREEWAY SEGMENTS WORKSHEET			
General Information		Site Information	
Analyst		Highway/Direction of Travel	<i>I-95 NB</i>
Agency or Company	<i>AECOM</i>	From/To	<i>Seg 12-North of Hillsboro</i>
Date Performed		Jurisdiction	
Analysis Time Period	<i>AM</i>	Analysis Year	<i>2040 Build 2A</i>
Project Description <i>SW 10th Street SIMR</i>			
<input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data			
Flow Inputs			
Volume, V	<i>6190</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	0.95
Peak-Hr Prop. of AADT, K			%Trucks and Buses, P _T
Peak-Hr Direction Prop, D			3
DDHV = AADT x K x D		veh/h	%RVs, P _R
			0
			General Terrain:
			<i>Level</i>
			Grade % Length
			<i>mi</i>
			Up/Down %
Calculate Flow Adjustments			
f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>
Speed Inputs		Calc Speed Adj and FFS	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f _{LW}	mph
Number of Lanes, N	<i>4</i>	f _{LC}	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured)	<i>70.0</i>	FFS	<i>70.0</i>
Base free-flow Speed, BFFS	mph		mph
LOS and Performance Measures		Design (N)	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	<i>1653</i>	Design LOS	
S	<i>67.6</i>	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h/ln
D = v _p / S	<i>24.4</i>	S	mph
LOS	<i>C</i>	D = v _p / S	pc/mi/ln
		Required Number of Lanes, N	
Glossary		Factor Location	
N - Number of lanes	S - Speed	E _R - Exhibits 11-10, 11-12	f _{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9
v _p - Flow rate	FFS - Free-flow speed	f _p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v _p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency/Company	AECOM	Weaving Segment Location	Seg 1-Bet Copans & Sample
Date Performed		Analysis Year	2040 Build 2A
Analysis Time Period	PM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2380ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4145	0.95	3	0	1.5	1.2	0.985	1.00	4429
V_{RF}	495	0.92	2	0	1.5	1.2	0.990	1.00	543
V_{FR}	1820	0.92	2	0	1.5	1.2	0.990	1.00	1998
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	4429							V =	6970
V_W	2541								
VR	0.365								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	787

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	6880 veh/h	Weaving intensity factor, W	
Weaving segment capacity, c_w	6486 veh/h	Weaving segment speed, S	mph
Weaving segment v/c ratio	1.061	Average weaving speed, S_W	mph
Weaving segment density, D	pc/mi/ln	Average non-weaving speed, S_{NW}	mph
Level of Service, LOS	F	Maximum weaving length, L_{MAX}	6287 ft

Notes

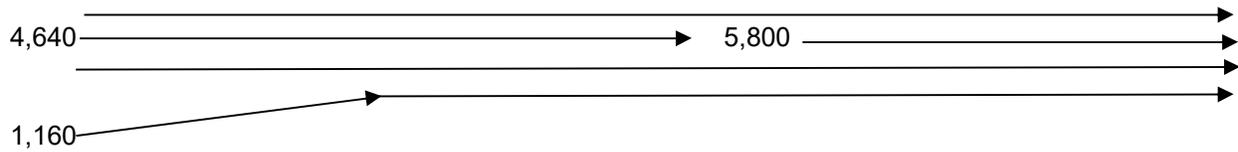
- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst		Highway/Direction of Travel	I-95 NB
Agency or Company	AECOM	From/To	Seg 2-Bet Off & On from Sample
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040 Build 2A
Project Description SW 10th Street SIMR			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			
Flow Inputs			
Volume, V	4640	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, P _T
Peak-Hr Prop. of AADT, K			%RVs, P _R
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
			Up/Down %
			0.95
			3
			0
			Level
			mi
Calculate Flow Adjustments			
f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985
Speed Inputs		Calc Speed Adj and FFS	
Lane Width	ft	f _{LV}	mph
Rt-Side Lat. Clearance	ft	f _{LC}	mph
Number of Lanes, N	3	TRD Adjustment	mph
Total Ramp Density, TRD	ramps/mi	FFS	70.0
FFS (measured)	70.0	mph	mph
Base free-flow Speed, BFFS	mph		
LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	1652	Design LOS	
S	67.6	v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)	pc/h/ln
D = v _p / S	24.4	S	mph
LOS	C	D = v _p / S	pc/mi/ln
		Required Number of Lanes, N	
Glossary		Factor Location	
N - Number of lanes	S - Speed	E _R - Exhibits 11-10, 11-12	f _{LV} - Exhibit 11-8
V - Hourly volume	D - Density	E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9
v _p - Flow rate	FFS - Free-flow speed	f _p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v _p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 3: I-95 Northbound On-Ramp from WB Sample Road
Analysis Period: PM Peak Hour
Analysis Year: 2040 Build 2A



PHF =	0.95	
$V_{fr} =$	5,800	vph
$V_r =$	1,160	vph
$V_f =$	4,640	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.985</u>
Ramp $f_{HV} =$	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.9901</u>
flat terrain $E_T =$	1.5	
RV % =	0	
Driver Population adj. $f_P =$	1.000	
$V_{fr} =$	$=V_r/(PHF)(f_{HV})(f_P) =$	6,197 pc/h
$V_r =$	$=V_r/(PHF)(f_{HV})(f_P) =$	1,233 pc/h
$V_f =$	$=V_f/(PHF)(f_{HV})(f_P) =$	4,957 pc/h
No. lanes upstream of ramp $N =$	3	

<u>No. Ln</u>	<u>Capacity Check (see Exhibits 25-3 and 25-7):</u>	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,197	0.65	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	4,957	0.69	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,233	0.59	No

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 4-On from Exp
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off $L_{up} =$ ft $V_u =$ veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A 1500 Deceleration Lane Length L_D Freeway Volume, V_F 5800 Ramp Volume, V_R 730 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off $L_{down} =$ 2950 ft $V_D =$ 420 veh/h
--	--	--

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5800	0.95	Level	3	0	0.985	1.00	6197
Ramp	730	0.92	Level	2	0	0.990	1.00	801
UpStream								
DownStream	420	0.92	Level	2	0	0.990	1.00	461

Merge Areas

Diverge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 $L_{EQ} =$
 $P_{FM} =$ 0.118 using Equation (Exhibit 13-6)
 $V_{12} =$ 729 pc/h
 V_3 or V_{av34} 2734 pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ 2478 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 $L_{EQ} =$
 $P_{FD} =$ using Equation (Exhibit 13-7)
 $V_{12} =$ pc/h
 V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V_{FO}	6998	Exhibit 13-8	No	V_F		Exhibit 13-8	
				$V_{FO} = V_F - V_R$		Exhibit 13-8	
				V_R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	3576	Exhibit 13-8	4600:All
			No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 $D_R =$ 25.1 (pc/mi/ln)
 LOS = C (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 $D_R =$ (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

$M_S =$ 0.310 (Exhibit 13-11)
 $S_R =$ 61.3 mph (Exhibit 13-11)
 $S_0 =$ 66.0 mph (Exhibit 13-11)
 $S =$ 63.4 mph (Exhibit 13-13)

Speed Determination

$D_s =$ (Exhibit 13-12)
 $S_R =$ mph (Exhibit 13-12)
 $S_0 =$ mph (Exhibit 13-12)
 $S =$ mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 5-Off to Exp from GPL
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 2950 ft V _u = 730 veh/h	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 6530 Ramp Volume, V_R 420 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%;"> Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L_{down} = ft V_D = veh/h </td> </tr> </table>	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6530 Ramp Volume, V _R 420 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6530 Ramp Volume, V _R 420 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6530	0.95	Level	3	0	0.985	1.00	6977
Ramp	420	0.92	Level	2	0	0.990	1.00	461
UpStream	730	0.92	Level	2	0	0.990	1.00	801
DownStream								

Merge Areas	Diverge Areas
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Estimation of v ₁₂	Estimation of v ₁₂
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 3302 pc/h V ₃ or V _{av34} 1837 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

Capacity Checks				Capacity Checks				
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?	
V _{FO}		Exhibit 13-8		V _F	6977	Exhibit 13-8	9600	No
				V _{FO} = V _F - V _R	6516	Exhibit 13-8	9600	No
				V _R	461	Exhibit 13-10	2100	No

Flow Entering Merge Influence Area	Flow Entering Diverge Influence Area
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	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?	
V _{R12}		Exhibit 13-8		V ₁₂	3302	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
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$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 30.8 (pc/mi/ln) LOS = D (Exhibit 13-2)
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Speed Determination	Speed Determination
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M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)	D _s = 0.339 (Exhibit 13-12) S _R = 60.5 mph (Exhibit 13-12) S ₀ = 73.5 mph (Exhibit 13-12) S = 66.7 mph (Exhibit 13-13)
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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 6-South of Off to 10th*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>6110</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1632* pc/h/ln
 S *67.8* mph
 $D = v_p / S$ *24.1* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

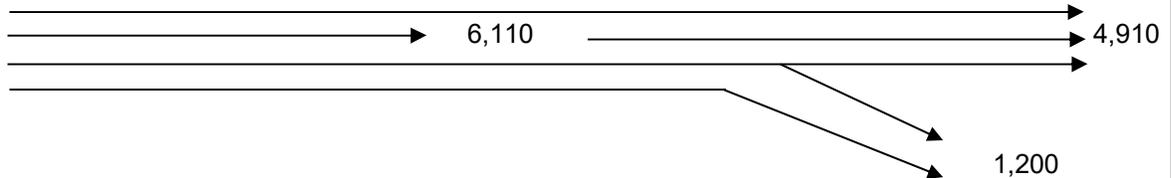
N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 7: I-95 NB Off-Ramp to SW 10th St EB & WB
Analysis Period: PM Peak Hour
Analysis Year: 2040 Build 2A



PHF =	0.95	
v_{fr} =	6,110	vph
v_r =	1,200	vph
v_f =	4,910	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	6,528 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,276 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	5,246 pc/h
No. lanes upstream of ramp N =	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

D = 0.0175 (V_{fr}/N) = 28.6 pc/ln

LOS in the Diverge Area (from Density and Exhibit 13-2) =

D

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	6,528	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	5,246	No
2	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	4,200	1,276	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 8-Bet Off & Off Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4910</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1749* pc/h/ln
 S *66.5* mph
 $D = v_p / S$ *26.3* pc/mi/ln
 LOS *D*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 NB
Agency or Company	AECOM	Junction	Seg 9-Off to Hillsboro EB&WB
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{up} = ft V _u = veh/h	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 4910 Ramp Volume, V_R 1360 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%;"> Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L_{down} = 2100 ft V_D = 1800 veh/h </td> </tr> </table>	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 4910 Ramp Volume, V _R 1360 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2100 ft V _D = 1800 veh/h
Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 4910 Ramp Volume, V _R 1360 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{down} = 2100 ft V _D = 1800 veh/h		

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	4910	0.95	Level	3	0	0.985	1.00	5246
Ramp	1360	0.92	Level	2	0	0.990	1.00	1493
UpStream								
DownStream	1800	0.92	Level	2	0	0.990	1.00	1976

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.560 using Equation (Exhibit 13-7) V ₁₂ = 3595 pc/h V ₃ or V _{av34} 1651 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	5246	Exhibit 13-8	7200 No
				V _{FO} = V _F - V _R	3753	Exhibit 13-8	7200 No
				V _R	1493	Exhibit 13-10	2100 No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3595	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 33.4 (pc/mi/ln) LOS = D (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11)	D _s = 0.432 (Exhibit 13-12)
S _R = mph (Exhibit 13-11)	S _R = 57.9 mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-11)	S ₀ = 74.3 mph (Exhibit 13-12)
S = mph (Exhibit 13-13)	S = 62.2 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 NB*
 From/To *Seg 10-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	3550	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P _T	3
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1264* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *18.1* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

BASIC FREEWAY SEGMENTS WORKSHEET			
General Information		Site Information	
Analyst	Highway/Direction of Travel <i>I-95 NB</i>		
Agency or Company <i>AECOM</i>	From/To <i>Seg 12-North of Hillsboro</i>		
Date Performed	Jurisdiction		
Analysis Time Period <i>PM</i>	Analysis Year <i>2040 Build 2A</i>		
Project Description <i>SW 10th Street SIMR</i>			
<input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data			
Flow Inputs			
Volume, V <i>5610</i>	veh/h	Peak-Hour Factor, PHF <i>0.95</i>	
AADT	veh/day	%Trucks and Buses, P _T <i>3</i>	
Peak-Hr Prop. of AADT, K		%RVs, P _R <i>0</i>	
Peak-Hr Direction Prop, D		General Terrain: <i>Level</i>	
DDHV = AADT x K x D	veh/h	Grade % Length <i>mi</i>	
		Up/Down %	
Calculate Flow Adjustments			
f _p <i>1.00</i>		E _R <i>1.2</i>	
E _T <i>1.5</i>		f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)] <i>0.985</i>	
Speed Inputs		Calc Speed Adj and FFS	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f _{LW}	mph
Number of Lanes, N <i>4</i>		f _{LC}	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured) <i>70.0</i>	mph	FFS	<i>70.0</i> mph
Base free-flow Speed, BFFS	mph		
LOS and Performance Measures		Design (N)	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v _p = (V or DDHV) / (PHF x N x f _{HV}) <i>1498</i>	pc/h/ln	Design LOS	
x f _p)		v _p = (V or DDHV) / (PHF x N x f _{HV})	pc/h/ln
S <i>69.0</i>	mph	x f _p)	
D = v _p / S <i>21.7</i>	pc/mi/ln	S	mph
LOS <i>C</i>		D = v _p / S	pc/mi/ln
		Required Number of Lanes, N	
Glossary		Factor Location	
N - Number of lanes	S - Speed	E _R - Exhibits 11-10, 11-12	f _{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E _T - Exhibits 11-10, 11-11, 11-13	f _{LC} - Exhibit 11-9
v _p - Flow rate	FFS - Free-flow speed	f _p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v _p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 1-Bet Hillsboro & Palmetto*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4810</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1285* pc/h/ln
 S *69.9* mph
 $D = v_p / S$ *18.4* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst Agency/Company AECOM Date Performed Analysis Time Period AM					Freeway/Dir of Travel 195/SB Weaving Segment Location Seg 2-Bet On from Exp & Off Analysis Year 2040 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Weaving configuration Two-Sided Weaving number of lanes, N 4 Weaving segment length, L _s 3900ft Freeway free-flow speed, FFS 70 mph				Segment type Freeway Freeway minimum speed, S _{MIN} 15 Freeway maximum capacity, C _{IFL} 2400 Terrain type Level					
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)
V _{FF}	3520	0.95	3	0	1.5	1.2	0.985	1.00	3761
V _{RF}	1140	0.92	2	0	1.5	1.2	0.990	1.00	1252
V _{FR}	1290	0.92	2	0	1.5	1.2	0.990	1.00	1416
V _{RR}	130	0.92	2	0	1.5	1.2	0.990	1.00	143
V _{NW}	6429							V =	6572
V _W	143								
VR	0.022								
Configuration Characteristics									
Minimum maneuver lanes, N _{WL} 0 lc				Minimum weaving lane changes, LC _{MIN} 429 lc/h					
Interchange density, ID 0.7 int/mi				Weaving lane changes, LC _W 1001 lc/h					
Minimum RF lane changes, LC _{RF} 0 lc/pc				Non-weaving lane changes, LC _{NW} 2986 lc/h					
Minimum FR lane changes, LC _{FR} 0 lc/pc				Total lane changes, LC _{ALL} 3987 lc/h					
Minimum RR lane changes, LC _{RR} 3 lc/pc				Non-weaving vehicle index, I _{NW} 1755					
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v 6488 veh/h				Weaving intensity factor, W 0.230					
Weaving segment capacity, c _w 8847 veh/h				Weaving segment speed, S 59.0 mph					
Weaving segment v/c ratio 0.733				Average weaving speed, S _w 59.7 mph					
Weaving segment density, D 27.8 pc/mi/ln				Average non-weaving speed, S _{NW} 59.0 mph					
Level of Service, LOS C				Maximum weaving length, L _{MAX} 5929 ft					
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 3-Bet Off & On Ramp*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4660</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1660* pc/h/ln
 S *67.5* mph
 $D = v_p / S$ *24.6* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 5-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>2770</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *987* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *14.1* pc/mi/ln
 LOS *B*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 6-Merge from Hillsboro E&W
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040 Build 2A
Project Description SW 10th Street SIMR			

Inputs

Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A 300 Deceleration Lane Length L _D Freeway Volume, V _F 2770 Ramp Volume, V _R 1660 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 50.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
L _{up} = 2400 ft V _u = 1890 veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	2770	0.95	Level	3	0	0.985	1.00	2960
Ramp	1660	0.92	Level	2	0	0.990	1.00	1822
UpStream	1890	0.92	Level	2	0	0.990	1.00	2075
DownStream								

Merge Areas	Diverge Areas
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Estimation of v₁₂

$V_{12} = V_F (P_{FM})$ L _{EQ} = 1369.55 (Equation 13-6 or 13-7) P _{FM} = 0.586 using Equation (Exhibit 13-6) V ₁₂ = 1734 pc/h V ₃ or V _{av34} = 1226 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = 1734 pc/h (Equation 13-16, 13-18, or 13-19)	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)
--	--

Estimation of v₁₂

Capacity Checks

	Actual	Capacity	LOS F?
V _{FO}	4782	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V _F		Exhibit 13-8	
V _{FO} = V _F - V _R		Exhibit 13-8	
V _R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V _{R12}	3556	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V ₁₂		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 30.5 (pc/mi/ln) LOS = D (Exhibit 13-2)	$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)
---	--

Level of Service Determination (if not F)

Speed Determination

M _S = 0.428 (Exhibit 13-11)
S _R = 58.0 mph (Exhibit 13-11)
S ₀ = 67.4 mph (Exhibit 13-11)
S = 60.2 mph (Exhibit 13-13)

Speed Determination

D _s = (Exhibit 13-12)
S _R = mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 7-Bet On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4430</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1578* pc/h/ln
 S *68.3* mph
 $D = v_p / S$ *23.1* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

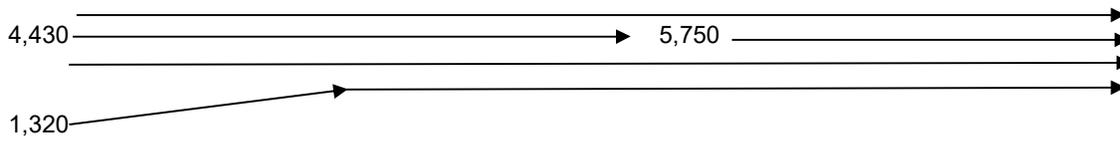
N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 8: I-95 Southbound On-Ramp from SW 10th Street EB & WB
Analysis Period: AM Peak Hour
Analysis Year: 2040 Build 2A



	PHF =	0.95	
	v_{fr} =	5,750	vph
	v_r =	1,320	vph
	v_f =	4,430	
Upstream Freeway	Tr % =	3%	
Ramp	Tr % =	2%	
Downstream Freeway	Tr % =	3%	
Freeway	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.985</u>
Ramp	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	<u>0.9901</u>
flat terrain	E_T =	1.5	
	RV % =	0	
Driver Population adj.	f_p =	1.000	
	V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_p) =$	6,143 pc/h
	V_r =	$=v_r/(PHF)(f_{HV})(f_p) =$	1,403 pc/h
	V_f =	$=v_f/(PHF)(f_{HV})(f_p) =$	4,733 pc/h
No. lanes upstream of ramp	N =	3	

No. Ln	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,143	0.64	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	4,733	0.66	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,403	0.67	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 9-Bet 10th & Exit to Exp*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>5750</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) *1536* pc/h/ln
 S *68.7* mph
 D = v_p / S *22.4* pc/mi/ln
 LOS *C*

Design (N)

Design (N)

Design LOS
 v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) pc/h/ln
 S mph
 D = v_p / S pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 10-Merge from Ex to GP
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off $L_{up} =$ ft $V_u =$ veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A 600 Deceleration Lane Length L_D Freeway Volume, V_F 5750 Ramp Volume, V_R 400 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off $L_{down} =$ 1150 ft $V_D =$ 760 veh/h
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Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5750	0.95	Level	3	0	0.985	1.00	6143
Ramp	400	0.92	Level	2	0	0.990	1.00	439
UpStream								
DownStream	760	0.92	Level	2	0	0.990	1.00	834

Merge Areas

Diverge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 $L_{EQ} =$
 $P_{FM} =$ 0.163 using Equation (Exhibit 13-6)
 $V_{12} =$ 1001 pc/h
 V_3 or V_{av34} 2571 pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ 2457 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 $L_{EQ} =$
 $P_{FD} =$ using Equation (Exhibit 13-7)
 $V_{12} =$ pc/h
 V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V_{FO}	6582	Exhibit 13-8	No	V_F		Exhibit 13-8	
				$V_{FO} = V_F - V_R$		Exhibit 13-8	
				V_R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	2896	Exhibit 13-8	4600:All
			No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 $D_R =$ 24.1 (pc/mi/ln)
 LOS = C (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 $D_R =$ (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

$M_S =$ 0.332 (Exhibit 13-11)
 $S_R =$ 60.7 mph (Exhibit 13-11)
 $S_0 =$ 65.2 mph (Exhibit 13-11)
 $S =$ 63.1 mph (Exhibit 13-13)

Speed Determination

$D_S =$ (Exhibit 13-12)
 $S_R =$ mph (Exhibit 13-12)
 $S_0 =$ mph (Exhibit 13-12)
 $S =$ mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 11- Diverge to Express
Date Performed		Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 1150 ft V _u = 400 veh/h	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6150 Ramp Volume, V _R 760 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h	

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6150	0.95	Level	3	0	0.985	1.00	6571
Ramp	760	0.92	Level	2	0	0.990	1.00	834
UpStream	400	0.92	Level	2	0	0.990	1.00	439
DownStream								

Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
V ₁₂ = V _F (P _{FM}) (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					V ₁₂ = V _R + (V _F - V _R)P _{FD} (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 3335 pc/h V ₃ or V _{av34} 1618 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				

Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	6571	Exhibit 13-8	9600	No
					V _{FO} = V _F - V _R	5737	Exhibit 13-8	9600	No
					V _R	834	Exhibit 13-10	2100	No

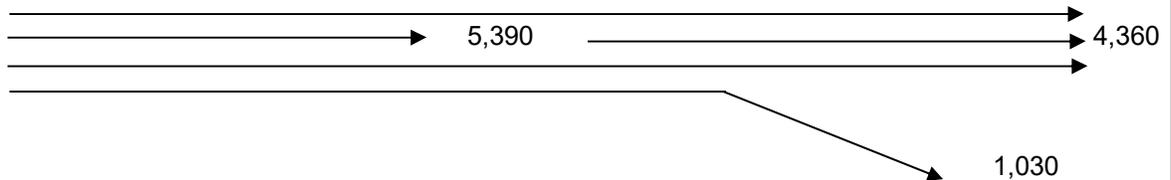
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3335	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)				Level of Service Determination (if not F)			
D _R = 5.475 + 0.00734 v _R + 0.0078 V ₁₂ - 0.00627 L _A D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				D _R = 4.252 + 0.0086 V ₁₂ - 0.009 L _D D _R = 34.0 (pc/mi/ln) LOS = D (Exhibit 13-2)			

Speed Determination		Speed Determination	
M _S = (Exhibit 13-11)		D _s = 0.373 (Exhibit 13-12)	
S _R = mph (Exhibit 13-11)		S _R = 59.6 mph (Exhibit 13-12)	
S ₀ = mph (Exhibit 13-11)		S ₀ = 75.0 mph (Exhibit 13-12)	
S = mph (Exhibit 13-13)		S = 65.5 mph (Exhibit 13-13)	

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 12: I-95 SB Off-Ramp to Sample Road EB & WB
Analysis Period: AM Peak Hour
Analysis Year: 2040 Build 2A



PHF =	0.95	
v_{fr} =	5,390	vph
v_r =	1,030	vph
v_f =	4,360	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	5,759 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,095 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	4,658 pc/h
No. lanes upstream of ramp N =	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

D = 0.0175 (V_{fr}/N) = 25.2 pc/ln

LOS in the Diverge Area (from Density and Exhibit 13-2) =

C

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	5,759	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	4,658	No
1	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	2,100	1,095	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *AM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 13-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4360</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1553* pc/h/ln
 S *68.6* mph
 $D = v_p / S$ *22.7* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency/Company	AECOM	Weaving Segment Location	Seg 14- Bet Sample & Copans
Date Performed		Analysis Year	2040 Build 2A
Analysis Time Period	AM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2520ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3630	0.95	3	0	1.5	1.2	0.985	1.00	3878
V_{RF}	1960	0.92	2	0	1.5	1.2	0.990	1.00	2152
V_{FR}	730	0.92	2	0	1.5	1.2	0.990	1.00	801
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	3878							V =	6831
V_W	2953								
VR	0.432								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	6745 veh/h	Weaving intensity factor, W	
Weaving segment capacity, c_w	5470 veh/h	Weaving segment speed, S	mph
Weaving segment v/c ratio	1.233	Average weaving speed, S_W	mph
Weaving segment density, D	pc/mi/ln	Average non-weaving speed, S_{NW}	mph
Level of Service, LOS	F	Maximum weaving length, L_{MAX}	7046 ft

Notes

- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 1-Bet Hillsboro & Palmetto*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4960</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1325* pc/h/ln
 S *69.8* mph
 $D = v_p / S$ *19.0* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst Agency/Company AECOM Date Performed Analysis Time Period PM					Freeway/Dir of Travel 195/SB Weaving Segment Location Seg 2-Bet On from Exp & Off Analysis Year 2040 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Weaving configuration Two-Sided Weaving number of lanes, N 4 Weaving segment length, L _s 3900ft Freeway free-flow speed, FFS 70 mph				Segment type Freeway Freeway minimum speed, S _{MIN} 15 Freeway maximum capacity, C _{IFL} 2400 Terrain type Level					
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)
V _{FF}	3825	0.95	3	0	1.5	1.2	0.985	1.00	4087
V _{RF}	1125	0.92	2	0	1.5	1.2	0.990	1.00	1235
V _{FR}	1135	0.92	2	0	1.5	1.2	0.990	1.00	1246
V _{RR}	125	0.92	2	0	1.5	1.2	0.990	1.00	137
V _{NW}	6568							V =	6705
V _W	137								
VR	0.020								
Configuration Characteristics									
Minimum maneuver lanes, N _{WL} 0 lc				Minimum weaving lane changes, LC _{MIN} 411 lc/h					
Interchange density, ID 0.7 int/mi				Weaving lane changes, LC _W 983 lc/h					
Minimum RF lane changes, LC _{RF} 0 lc/pc				Non-weaving lane changes, LC _{NW} 3043 lc/h					
Minimum FR lane changes, LC _{FR} 0 lc/pc				Total lane changes, LC _{ALL} 4026 lc/h					
Minimum RR lane changes, LC _{RR} 3 lc/pc				Non-weaving vehicle index, I _{NW} 1793					
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v 6619 veh/h				Weaving intensity factor, W 0.232					
Weaving segment capacity, c _w 8851 veh/h				Weaving segment speed, S 59.0 mph					
Weaving segment v/c ratio 0.748				Average weaving speed, S _w 59.7 mph					
Weaving segment density, D 28.4 pc/mi/ln				Average non-weaving speed, S _{NW} 59.0 mph					
Level of Service, LOS D				Maximum weaving length, L _{MAX} 5916 ft					
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 3-Bet Off & On Ramp*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4950</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1763* pc/h/ln
 S *66.3* mph
 $D = v_p / S$ *26.6* pc/mi/ln
 LOS *D*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Site Information

Analyst	Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction
Date Performed		Seg 4-Diverge to SW 10th St
Analysis Time Period	PM	Jurisdiction
		Analysis Year
		2040 Build 2A

Project Description SW 10th Street SIMR

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off $L_{up} =$ ft $V_u =$ veh/h	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 4950 Ramp Volume, V_R 1710 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off $L_{down} =$ 2400 ft $V_D =$ 1740 veh/h
--	--	---

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4950	0.95	Level	3	0	0.985	1.00	5289
Ramp	1710	0.92	Level	2	0	0.990	1.00	1877
UpStream								
DownStream	1740	0.92	Level	2	0	0.990	1.00	1910

Merge Areas

Diverge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
 $L_{EQ} =$ (Equation 13-6 or 13-7)
 $P_{FM} =$ using Equation (Exhibit 13-6)
 $V_{12} =$ pc/h
 V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 $L_{EQ} =$ (Equation 13-12 or 13-13)
 $P_{FD} =$ 0.541 using Equation (Exhibit 13-7)
 $V_{12} =$ 3724 pc/h
 V_3 or V_{av34} 1565 pc/h (Equation 13-14 or 13-17)
 Is V_3 or $V_{av34} > 2,700$ pc/h? Yes No
 Is V_3 or $V_{av34} > 1.5 * V_{12}/2$ Yes No
 If Yes, $V_{12a} =$ pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 13-8	

Capacity Checks

	Actual	Capacity	LOS F?
V_F	5289	Exhibit 13-8	7200 No
$V_{FO} = V_F - V_R$	3412	Exhibit 13-8	7200 No
V_R	1877	Exhibit 13-10	2100 No

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 13-8	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}	3724	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$
 $D_R =$ (pc/mi/ln)
 $LOS =$ (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 $D_R =$ 34.5 (pc/mi/ln)
 $LOS =$ D (Exhibit 13-2)

Speed Determination

$M_S =$ (Exhibit 13-11)
 $S_R =$ mph (Exhibit 13-11)
 $S_0 =$ mph (Exhibit 13-11)
 $S =$ mph (Exhibit 13-13)

Speed Determination

$D_s =$ 0.467 (Exhibit 13-12)
 $S_R =$ 56.9 mph (Exhibit 13-12)
 $S_0 =$ 74.6 mph (Exhibit 13-12)
 $S =$ 61.2 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 5-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	3240	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P _T	3
Peak-Hr Prop. of AADT, K			%RVs, P _R	0
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	1.00	E _R	1.2
E _T	1.5	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.985

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1154* pc/h/ln
 S *70.0* mph
 $D = v_p / S$ *16.5* pc/mi/ln
 LOS *B*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 6-Merge from Hillsboro E&W
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040 Build 2A
Project Description SW 10th Street SIMR			

Inputs

Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off	Freeway Number of Lanes, N 3 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A 300 Deceleration Lane Length L _D Freeway Volume, V _F 3240 Ramp Volume, V _R 1740 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 50.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
L _{up} = 2400 ft V _u = 1710 veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	3240	0.95	Level	3	0	0.985	1.00	3462
Ramp	1740	0.92	Level	2	0	0.990	1.00	1910
UpStream	1710	0.92	Level	2	0	0.990	1.00	1877
DownStream								

Merge Areas	Diverge Areas
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Estimation of v₁₂

$V_{12} = V_F (P_{FM})$ L _{EQ} = 1495.81 (Equation 13-6 or 13-7) P _{FM} = 0.586 using Equation (Exhibit 13-6) V ₁₂ = 2028 pc/h V ₃ or V _{av34} = 1434 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = 2028 pc/h (Equation 13-16, 13-18, or 13-19)
--

Estimation of v₁₂

$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)
--

Capacity Checks

	Actual	Capacity	LOS F?
V _{FO}	5372	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V _F		Exhibit 13-8	
V _{FO} = V _F - V _R		Exhibit 13-8	
V _R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V _{R12}	3938	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V ₁₂		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 33.4 (pc/mi/ln) LOS = D (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)
--

Speed Determination

M _S = 0.491 (Exhibit 13-11)
S _R = 56.2 mph (Exhibit 13-11)
S ₀ = 66.6 mph (Exhibit 13-11)
S = 58.7 mph (Exhibit 13-13)

Speed Determination

D _s = (Exhibit 13-12)
S _R = mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 7-Bet On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4980</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1774* pc/h/ln
 S *66.2* mph
 $D = v_p / S$ *26.8* pc/mi/ln
 LOS *D*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

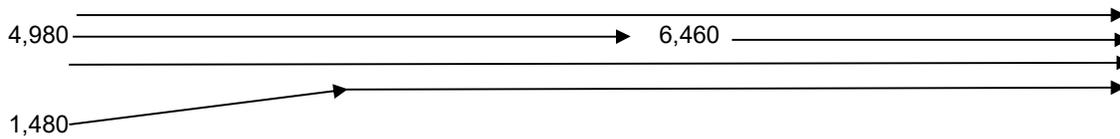
N - Number of lanes S - Speed
 V - Hourly volume D - Density
 v_p - Flow rate FFS - Free-flow speed
 LOS - Level of service BFFS - Base free-flow speed
 DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
 E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
 f_p - Page 11-18 TRD - Page 11-11
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 8: I-95 Southbound On-Ramp from SW 10th Street EB & WB
Analysis Period: PM Peak Hour
Analysis Year: 2040 Build 2A



	PHF =	0.95	
	v_{fr} =	6,460	vph
	v_r =	1,480	vph
	v_f =	4,980	
Upstream Freeway	Tr % =	3%	
Ramp	Tr % =	2%	
Downstream Freeway	Tr % =	3%	
Freeway	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp	f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain	E_T =	1.5	
	RV % =	0	
Driver Population adj.	f_P =	1.000	
	V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	6,902 pc/h
	V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,573 pc/h
	V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	5,321 pc/h
No. lanes upstream of ramp	N =	3	

No. Ln	Capacity Check (see Exhibits 25-3 and 25-7):	Maximum	Actual	V/c	LOS F?
4	Fwy downstream of ramp (assume 70 mph free-flow speed) =	9,600	6,902	0.72	No
3	Fwy upstream of ramp (assume 70 mph free-flow speed) =	7,200	5,321	0.74	No
1	Capacity on On-Ramp (assume 45 mph free-flow speed) =	2,100	1,573	0.75	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 9-Bet 10th & Exit to Exp*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>6460</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *4*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1726* pc/h/ln
 S *66.8* mph
 $D = v_p / S$ *25.8* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 10-Merge from Ex to GP
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040 Build 2A
Project Description SW 10th Street SIMR			

Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A 600 Deceleration Lane Length L _D Freeway Volume, V _F 6460 Ramp Volume, V _R 390 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 50.0	Downstream Adj Ramp <input checked="" type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input checked="" type="checkbox"/> Off L _{down} = 1150 ft V _D = 750 veh/h
L _{up} = ft		
V _u = veh/h		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6460	0.95	Level	3	0	0.985	1.00	6902
Ramp	390	0.92	Level	2	0	0.990	1.00	428
UpStream								
DownStream	750	0.92	Level	2	0	0.990	1.00	823

Merge Areas

Diverge Areas

Estimation of v₁₂

$V_{12} = V_F (P_{FM})$
 (Equation 13-6 or 13-7)
 P_{FM} = 0.164 using Equation (Exhibit 13-6)
 V₁₂ = 1134 pc/h
 V₃ or V_{av34} = 2884 pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = 2760 pc/h (Equation 13-16, 13-18, or 13-19)

Estimation of v₁₂

$V_{12} = V_R + (V_F - V_R)P_{FD}$
 (Equation 13-12 or 13-13)
 P_{FD} = using Equation (Exhibit 13-7)
 V₁₂ = pc/h
 V₃ or V_{av34} = pc/h (Equation 13-14 or 13-17)
 Is V₃ or V_{av34} > 2,700 pc/h? Yes No
 Is V₃ or V_{av34} > 1.5 * V₁₂/2 Yes No
 If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity	LOS F?
V _{FO}	7330	Exhibit 13-8	No

Capacity Checks

	Actual	Capacity	LOS F?
V _F		Exhibit 13-8	
V _{FO} = V _F - V _R		Exhibit 13-8	
V _R		Exhibit 13-10	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V _{R12}	3188	Exhibit 13-8	4600:All No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V ₁₂		Exhibit 13-8	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A$
 D_R = 26.4 (pc/mi/ln)
 LOS = C (Exhibit 13-2)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
 D_R = (pc/mi/ln)
 LOS = (Exhibit 13-2)

Speed Determination

M_S = 0.356 (Exhibit 13-11)
 S_R = 60.0 mph (Exhibit 13-11)
 S₀ = 64.3 mph (Exhibit 13-11)
 S = 62.4 mph (Exhibit 13-13)

Speed Determination

D_s = (Exhibit 13-12)
 S_R = mph (Exhibit 13-12)
 S₀ = mph (Exhibit 13-12)
 S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency or Company	AECOM	Junction	Seg 11- Diverge to Express
Date Performed		Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040 Build 2A

Project Description SW 10th Street SIMR

Inputs			
Upstream Adj Ramp <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L _{up} = 1150 ft V _u = 390 veh/h	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L_A Deceleration Lane Length L_D 200 Freeway Volume, V_F 6850 Ramp Volume, V_R 750 Freeway Free-Flow Speed, S_{FF} 70.0 Ramp Free-Flow Speed, S_{FR} 45.0 </td> <td style="width: 50%;"> Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L_{down} = ft V_D = veh/h </td> </tr> </table>	Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6850 Ramp Volume, V _R 750 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h
Freeway Number of Lanes, N 4 Ramp Number of Lanes, N 1 Acceleration Lane Length, L _A Deceleration Lane Length L _D 200 Freeway Volume, V _F 6850 Ramp Volume, V _R 750 Freeway Free-Flow Speed, S _{FF} 70.0 Ramp Free-Flow Speed, S _{FR} 45.0	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L _{down} = ft V _D = veh/h		

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p
Freeway	6850	0.95	Level	3	0	0.985	1.00	7319
Ramp	750	0.92	Level	2	0	0.990	1.00	823
UpStream	390	0.92	Level	2	0	0.990	1.00	428
DownStream								

Merge Areas	Diverge Areas
Estimation of v₁₂ $V_{12} = V_F (P_{FM})$ L _{EQ} = (Equation 13-6 or 13-7) P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)	Estimation of v₁₂ $V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EQ} = (Equation 13-12 or 13-13) P _{FD} = 0.436 using Equation (Exhibit 13-7) V ₁₂ = 3655 pc/h V ₃ or V _{av34} 1832 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V _{FO}		Exhibit 13-8		V _F	7319	Exhibit 13-8	9600 No
				V _{FO} = V _F - V _R	6496	Exhibit 13-8	9600 No
				V _R	823	Exhibit 13-10	2100 No

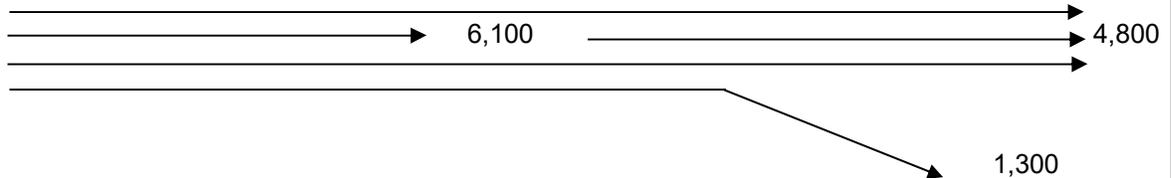
Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V _{R12}		Exhibit 13-8		V ₁₂	3655	Exhibit 13-8	4400:All No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 37.0 (pc/mi/ln) LOS = E (Exhibit 13-2)

Speed Determination	Speed Determination
M _S = (Exhibit 13-11)	D _s = 0.372 (Exhibit 13-12)
S _R = mph (Exhibit 13-11)	S _R = 59.6 mph (Exhibit 13-12)
S ₀ = mph (Exhibit 13-11)	S ₀ = 74.3 mph (Exhibit 13-12)
S = mph (Exhibit 13-13)	S = 65.4 mph (Exhibit 13-13)

Job: SW 10th Street SIMR
Analyst: AECOM

Location: Seg 12: I-95 SB Off-Ramp to Sample Road EB & WB
Analysis Period: PM Peak Hour
Analysis Year: 2040 Build 2A



PHF =	0.95	
v_{fr} =	6,100	vph
v_r =	1,300	vph
v_f =	4,800	
Upstream Freeway Tr % =	3%	
Ramp Tr % =	2%	
Downstream Freeway Tr % =	3%	
Freeway f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.985
Ramp f_{HV} =	$1/(1+P_T(E_T-1)+P_R(E_R-1)) =$	0.9901
flat terrain E_T =	1.5	
RV % =	0	
Driver Population adj. f_P =	1.000	
V_{fr} =	$=v_{fr}/(PHF)(f_{HV})(f_P) =$	6,517 pc/h
V_r =	$=v_r/(PHF)(f_{HV})(f_P) =$	1,382 pc/h
V_f =	$=v_f/(PHF)(f_{HV})(f_P) =$	5,128 pc/h
No. lanes upstream of ramp N =	4	

Average Freeway Density Upstream of Diverge (see Equation 13-26):

D = 0.0175 (V_{fr}/N) = 28.5 pc/ln

LOS in the Diverge Area (from Density and Exhibit 13-2) =

D

No. Ln	Capacity Check (see Exhibits 13-2, 13-8 and 13.10)	Maximum	Actual	LOS F?
4	Fwy upstream of ramp (assume 70 mph free-flow speed) =	9,600	6,517	No
3	Fwy downstream of ramp (assume 70 mph free-flow speed) =	7,200	5,128	No
1	Capacity on Off-Ramp (assume 45 mph free-flow speed) =	2,100	1,382	No

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst
 Agency or Company *AECOM*
 Date Performed
 Analysis Time Period *PM*

Site Information

Highway/Direction of Travel *I-95 SB*
 From/To *Seg 13-Bet Off & On Ramps*
 Jurisdiction
 Analysis Year *2040 Build 2A*

Project Description *SW 10th Street SIMR*

Oper.(LOS)

Des.(N)

Planning Data

Flow Inputs

Volume, V	<i>4800</i>	veh/h	Peak-Hour Factor, PHF	<i>0.95</i>
AADT		veh/day	%Trucks and Buses, P _T	<i>3</i>
Peak-Hr Prop. of AADT, K			%RVs, P _R	<i>0</i>
Peak-Hr Direction Prop, D			General Terrain:	<i>Level</i>
DDHV = AADT x K x D		veh/h	Grade % Length	<i>mi</i>
			Up/Down %	

Calculate Flow Adjustments

f _p	<i>1.00</i>	E _R	<i>1.2</i>
E _T	<i>1.5</i>	f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	<i>0.985</i>

Speed Inputs

Lane Width ft
 Rt-Side Lat. Clearance ft
 Number of Lanes, N *3*
 Total Ramp Density, TRD ramps/mi
 FFS (measured) *70.0* mph
 Base free-flow Speed, BFFS mph

Calc Speed Adj and FFS

f_{LW} mph
 f_{LC} mph
 TRD Adjustment mph
 FFS *70.0* mph

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1709* pc/h/ln
 S *67.0* mph
 $D = v_p / S$ *25.5* pc/mi/ln
 LOS *C*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln
 S mph
 $D = v_p / S$ pc/mi/ln
 Required Number of Lanes, N

Glossary

N - Number of lanes
 V - Hourly volume
 v_p - Flow rate
 LOS - Level of service
 DDHV - Directional design hour volume
 S - Speed
 D - Density
 FFS - Free-flow speed
 BFFS - Base free-flow speed

Factor Location

E_R - Exhibits 11-10, 11-12
 E_T - Exhibits 11-10, 11-11, 11-13
 f_p - Page 11-18
 LOS, S, FFS, v_p - Exhibits 11-2, 11-3
 f_{LW} - Exhibit 11-8
 f_{LC} - Exhibit 11-9
 TRD - Page 11-11

FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst		Freeway/Dir of Travel	I-95 SB
Agency/Company	AECOM	Weaving Segment Location	Seg 14- Bet Sample & Copans
Date Performed		Analysis Year	2040 Build 2A
Analysis Time Period	PM		

Project Description SW 10th Street SIMR

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2520ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4035	0.95	3	0	1.5	1.2	0.985	1.00	4311
V_{RF}	1560	0.92	2	0	1.5	1.2	0.990	1.00	1713
V_{FR}	765	0.92	2	0	1.5	1.2	0.990	1.00	840
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	4311							V =	6864
V_W	2553								
VR	0.372								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	lc/h
Interchange density, ID	0.7 int/mi	Weaving lane changes, LC_W	lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	6775 veh/h	Weaving intensity factor, W	
Weaving segment capacity, c_w	6357 veh/h	Weaving segment speed, S	mph
Weaving segment v/c ratio	1.066	Average weaving speed, S_W	mph
Weaving segment density, D	pc/mi/ln	Average non-weaving speed, S_{NW}	mph
Level of Service, LOS	F	Maximum weaving length, L_{MAX}	6368 ft

Notes

- a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
- b. For volumes that exceed the weaving segment capacity, the level of service is "F".

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 NB Express Lane				
Agency or Company		AECOM			Junction				
Date Performed					Off to SW 10th Connector				
Analysis Time Period		AM			Jurisdiction				
					Analysis Year				
					2040 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Deceleration Lane Length L _D			345			L _{down} = ft	
V _u = veh/h		Freeway Volume, V _F			1490			V _D = veh/h	
		Ramp Volume, V _R			220				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1490	0.95	Level	3	0	0.985	1.00	1592	
Ramp	220	0.95	Level	2	0	0.990	1.00	234	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 1592 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	1592	Exhibit 13-8	4800	No
			V _{FO} = V _F - V _R			1358	Exhibit 13-8	4800	No
			V _R			234	Exhibit 13-10	2200	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	1592	Exhibit 13-8	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 14.8 (pc/mi/ln) LOS = B (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D _S = 0.124 (Exhibit 13-12) S _R = 66.5 mph (Exhibit 13-12) S ₀ = N/A mph (Exhibit 13-12) S = 66.5 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 NB Express Lanes				
Agency or Company		AECOM			Junction				
Date Performed					On from SW 10th St. Connector				
Analysis Time Period		AM			Jurisdiction				
Project Description		SW 10th Street SIMR			Analysis Year				
					2040 Build 2A				
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1040			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Deceleration Lane Length L _D						L _{down} = ft	
V _u = veh/h		Freeway Volume, V _F			1270			V _D = veh/h	
		Ramp Volume, V _R			1490				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1270	0.95	Level	3	0	0.985	1.00	1357	
Ramp	1490	0.95	Level	2	0	0.990	1.00	1584	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)				
L _{EO} =					L _{EO} =				
P _{FM} = 1.000 using Equation (Exhibit 13-6)					P _{FD} = using Equation (Exhibit 13-7)				
V ₁₂ = 1357 pc/h					V ₁₂ = pc/h				
V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17)					V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17)				
Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No				
If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	2941	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	3103	Exhibit 13-8	4600:All	No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 21.2 (pc/mi/ln)					$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln)				
LOS = C (Exhibit 13-2)					LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.283 (Exhibit 13-11)					D _S = (Exhibit 13-12)				
S _R = 62.1 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)				
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)				
S = 62.1 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lane				
Agency or Company		AECOM			Junction				
Date Performed					Off to SW 10th Connector				
Analysis Time Period		AM			Jurisdiction				
					Analysis Year				
					2040 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A					<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D			250		L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1430		V _D = veh/h		
		Ramp Volume, V _R			670				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1430	0.95	Level	3	0	0.985	1.00	1528	
Ramp	670	0.95	Level	2	0	0.990	1.00	712	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 1528 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	1528	Exhibit 13-8	4800	No
			V _{FO} = V _F - V _R		816	Exhibit 13-8	4800	No	
			V _R		712	Exhibit 13-10	2200	No	
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	1528	Exhibit 13-8		4400:All
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 15.1 (pc/mi/ln) LOS = B (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D _S = 0.167 (Exhibit 13-12) S _R = 65.3 mph (Exhibit 13-12) S ₀ = N/A mph (Exhibit 13-12) S = 65.3 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lanes				
Agency or Company		AECOM			Junction				
Date Performed					On from SW 10th St. Connector				
Analysis Time Period		AM			Jurisdiction				
Project Description		SW 10th Street SIMR			Analysis Year				
					2040 Build 2A				
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1100		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D					L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			760		V _D = veh/h		
		Ramp Volume, V _R			430				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	760	0.95	Level	3	0	0.985	1.00	812	
Ramp	430	0.95	Level	2	0	0.990	1.00	457	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 812 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	1269	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	1366	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 8.3 (pc/mi/ln) LOS = A (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.204 (Exhibit 13-11)					D _S = (Exhibit 13-12)				
S _R = 64.3 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)				
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)				
S = 64.3 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 NB Express Lane				
Agency or Company		AECOM			Junction				
Date Performed		Jurisdiction			Off to SW 10th Connector				
Analysis Time Period		PM			Analysis Year				
					2040 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A					<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D			345		L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1290		V _D = veh/h		
		Ramp Volume, V _R			490				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1290	0.95	Level	3	0	0.985	1.00	1378	
Ramp	490	0.95	Level	2	0	0.990	1.00	521	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 1378 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	1378	Exhibit 13-8	4800	No
					V _{FO} = V _F - V _R	857	Exhibit 13-8	4800	No
					V _R	521	Exhibit 13-10	2200	No
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	1378	Exhibit 13-8	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 13.0 (pc/mi/ln) LOS = B (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D _S = 0.150 (Exhibit 13-12) S _R = 65.8 mph (Exhibit 13-12) S ₀ = N/A mph (Exhibit 13-12) S = 65.8 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst		Freeway/Dir of Travel			I-95 NB Express Lanes					
Agency or Company		AECOM			Junction					
Date Performed		Jurisdiction			On from SW 10th St. Connector					
Analysis Time Period		PM			Analysis Year					
					2040 Build 2A					
Project Description SW 10th Street SIMR										
Inputs										
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1040			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D						L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			800			V _D = veh/h		
		Ramp Volume, V _R			770					
		Freeway Free-Flow Speed, S _{FF}			70.0					
		Ramp Free-Flow Speed, S _{FR}			60.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p		
Freeway	800	0.95	Level	3	0	0.985	1.00	855		
Ramp	770	0.95	Level	2	0	0.990	1.00	819		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v ₁₂					Estimation of v ₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)					
L _{EO} =					L _{EO} =					
P _{FM} = 1.000 using Equation (Exhibit 13-6)					P _{FD} = using Equation (Exhibit 13-7)					
V ₁₂ = 855 pc/h					V ₁₂ = pc/h					
V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17)					V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17)					
Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No					
If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}	1674	Exhibit 13-8		No	V _F		Exhibit 13-8			
					V _{FO} = V _F - V _R		Exhibit 13-8			
					V _R		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}	1776	Exhibit 13-8		No	V ₁₂		Exhibit 13-8			
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 11.6 (pc/mi/ln)					$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln)					
LOS = B (Exhibit 13-2)					LOS = (Exhibit 13-2)					
Speed Determination					Speed Determination					
M _S = 0.219 (Exhibit 13-11)					D _S = (Exhibit 13-12)					
S _R = 63.9 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)					
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)					
S = 63.9 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lane				
Agency or Company		AECOM			Junction				
Date Performed		Jurisdiction			Off to SW 10th Connector				
Analysis Time Period		PM			Analysis Year				
					2040 Build 2A				
Project Description SW 10th Street SIMR									
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2		Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1		<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A					<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D			250		L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			2450		V _D = veh/h		
		Ramp Volume, V _R			980				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	2450	0.95	Level	3	0	0.985	1.00	2618	
Ramp	980	0.95	Level	2	0	0.990	1.00	1042	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v₁₂					Estimation of v₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L _{EQ} = P _{FM} = using Equation (Exhibit 13-6) V ₁₂ = pc/h V ₃ or V _{av34} pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L _{EQ} = P _{FD} = 1.000 using Equation (Exhibit 13-7) V ₁₂ = 2618 pc/h V ₃ or V _{av34} 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}		Exhibit 13-8			V _F	2618	Exhibit 13-8	4800	No
			V _{FO} = V _F - V _R		1576	Exhibit 13-8	4800	No	
			V _R		1042	Exhibit 13-10	2200	No	
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}		Exhibit 13-8			V ₁₂	2618	Exhibit 13-8	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = 24.5 (pc/mi/ln) LOS = C (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = (Exhibit 13-11) S _R = mph (Exhibit 13-11) S ₀ = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D _S = 0.197 (Exhibit 13-12) S _R = 64.5 mph (Exhibit 13-12) S ₀ = N/A mph (Exhibit 13-12) S = 64.5 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 SB Express Lanes				
Agency or Company		AECOM			Junction				
Date Performed					On from SW 10th St. Connector				
Analysis Time Period		PM			Jurisdiction				
Project Description		SW 10th Street SIMR			Analysis Year				
					2040 Build 2A				
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			1100			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Deceleration Lane Length L _D						L _{down} = ft	
V _u = veh/h		Freeway Volume, V _F			1470			V _D = veh/h	
		Ramp Volume, V _R			180				
		Freeway Free-Flow Speed, S _{FF}			70.0				
		Ramp Free-Flow Speed, S _{FR}			60.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1470	0.95	Level	3	0	0.985	1.00	1571	
Ramp	180	0.95	Level	2	0	0.990	1.00	191	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1571 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	1762	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	1950	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 12.2 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.216 (Exhibit 13-11) S _R = 63.9 mph (Exhibit 13-11) S ₀ = N/A mph (Exhibit 13-11) S = 63.9 mph (Exhibit 13-13)					D _S = (Exhibit 13-12) S _R = mph (Exhibit 13-12) S ₀ = mph (Exhibit 13-12) S = mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst		Freeway/Dir of Travel			I-95 NB CD					
Agency or Company		AECOM			Junction					N. of Hillsboro Blvd.
Date Performed		Jurisdiction								
Analysis Time Period		AM			Analysis Year					2040 Build 2A
Project Description SW 10th Street SIMR										
Inputs										
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			890			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L _{up} = ft		Deceleration Lane Length L _D						L _{down} = ft		
V _u = veh/h		Freeway Volume, V _F			1433			V _D = veh/h		
		Ramp Volume, V _R			780					
		Freeway Free-Flow Speed, S _{FF}			55.0					
		Ramp Free-Flow Speed, S _{FR}			40.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p		
Freeway	1433	0.95	Level	3	0	0.985	1.00	1531		
Ramp	780	0.95	Level	2	0	0.990	1.00	829		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v ₁₂					Estimation of v ₁₂					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13)					
L _{EO} = 1.000 using Equation (Exhibit 13-6)					L _{EO} = using Equation (Exhibit 13-7)					
P _{FM} = 1531 pc/h					P _{FD} = pc/h					
V ₁₂ = 1531 pc/h					V ₁₂ = pc/h					
V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17)					V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17)					
Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No					
If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V _{FO}	2360	Exhibit 13-8		No	V _F		Exhibit 13-8			
					V _{FO} = V _F - V _R		Exhibit 13-8			
					V _R		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V _{R12}	2360	Exhibit 13-8		No	V ₁₂		Exhibit 13-8			
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ D _R = 17.9 (pc/mi/ln)					$D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ D _R = (pc/mi/ln)					
LOS = B (Exhibit 13-2)					LOS = (Exhibit 13-2)					
Speed Determination					Speed Determination					
M _S = 0.291 (Exhibit 13-11)					D _S = (Exhibit 13-12)					
S _R = 51.2 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)					
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)					
S = 51.2 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Freeway/Dir of Travel			I-95 NB CD				
Agency or Company		AECOM			Junction				
Date Performed					N. of Hillsboro Blvd.				
Analysis Time Period		PM			Jurisdiction				
Project Description		SW 10th Street SIMR			Analysis Year				
					2040 Build 2A				
Inputs									
Upstream Adj Ramp		Freeway Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Ramp Number of Lanes, N			1			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Acceleration Lane Length, L _A			890			<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L _{up} = ft		Deceleration Lane Length L _D						L _{down} = ft	
V _u = veh/h		Freeway Volume, V _F			1830			V _D = veh/h	
		Ramp Volume, V _R			740				
		Freeway Free-Flow Speed, S _{FF}			55.0				
		Ramp Free-Flow Speed, S _{FR}			40.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f _{HV}	f _p	v = V/PHF x f _{HV} x f _p	
Freeway	1830	0.95	Level	3	0	0.985	1.00	1955	
Ramp	740	0.95	Level	2	0	0.990	1.00	787	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v ₁₂					Estimation of v ₁₂				
$V_{12} = V_F (P_{FM})$ L _{EO} = (Equation 13-6 or 13-7) P _{FM} = 1.000 using Equation (Exhibit 13-6) V ₁₂ = 1955 pc/h V ₃ or V _{av34} = 0 pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L _{EO} = (Equation 13-12 or 13-13) P _{FD} = using Equation (Exhibit 13-7) V ₁₂ = pc/h V ₃ or V _{av34} = pc/h (Equation 13-14 or 13-17) Is V ₃ or V _{av34} > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V ₃ or V _{av34} > 1.5 * V ₁₂ /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V _{12a} = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V _{FO}	2742	Exhibit 13-8		No	V _F		Exhibit 13-8		
					V _{FO} = V _F - V _R		Exhibit 13-8		
					V _R		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V _{R12}	2742	Exhibit 13-8		No	V ₁₂		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D _R = 20.9 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D _R = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M _S = 0.310 (Exhibit 13-11)					D _S = (Exhibit 13-12)				
S _R = 51.0 mph (Exhibit 13-11)					S _R = mph (Exhibit 13-12)				
S ₀ = N/A mph (Exhibit 13-11)					S ₀ = mph (Exhibit 13-12)				
S = 51.0 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)				