BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*JRE*	Highway/Direction of Travel *I-80 Eastbound*	
Agency or Company	*AECOM*	From/To	*Between Ints. 302 and 303*
Date Performed		Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*Alt2A 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	2746	veh/h	Peak-Hour Factor, PHF	0.94
AADT		veh/day	%Trucks and Buses, P_T	10
Peak-Hr Prop. of AADT, K			%RVs, P_R	1
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ *0.862*	

Speed Inputs

			### Calc Speed Adj and FFS		
Lane Width	12.0	ft			
Rt-Side Lat. Clearance	6.0	ft	f_{LW}	0.0	mph
Number of Lanes, N	2		f_{LC}	0.0	mph
Total Ramp Density, TRD	1.67	ramps/mi	TRD Adjustment	5.0	mph
FFS (measured)		mph	FFS	70.4	mph
Base free-flow Speed, BFFS	75.4	mph			

LOS and Performance Measures

Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   1784   pc/h/ln

S	66.0	mph
D = v_p / S	27.0	pc/mi/ln
LOS	D	

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	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	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*
Analyst	*JRE*	Highway/Direction of Travel *I-80 Eastbound*
Agency or Company	*AECOM*	From/To *Between Ints. 302 and 303*
Date Performed	*1/3/2014*	Jurisdiction
Analysis Time Period	*P.M. Peak Hour*	Analysis Year

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	3456	veh/h	Peak-Hour Factor, PHF	0.94
AADT		veh/day	%Trucks and Buses, P_T	12
Peak-Hr Prop. of AADT, K			%RVs, P_R	1
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   *2303*   pc/h/ln

S	*55.9*	mph
D = v_p / S	*41.2*	pc/mi/ln
LOS	*E*	

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 / Factor Location

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	

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

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*JRE*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 303 and 304*
Date Performed	*1/3/2014*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*Alt2A 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	2599	veh/h	Peak-Hour Factor, PHF	0.94
AADT		veh/day	%Trucks and Buses, P_T	10
Peak-Hr Prop. of AADT, K			%RVs, P_R	1
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs | ### Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*3*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures | ### Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1125*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.1*	pc/mi/ln
LOS	*B*	

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   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

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*JRE*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 303 and 304*
Date Performed	*1/3/2014*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*Alt2A 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	3275	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*5.0*	mph
FFS	*70.4*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1455*	pc/h/ln
S	*69.2*	mph
D = v_p / S	*21.0*	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	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	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

		Site Information	
Analyst	JRE	Highway/Direction of Travel	I-80 Westbound
Agency or Company	AECOM	From/To	Between Ints. 302 and 303
Date Performed	1/3/2014	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	Alt2A 2045

Project Description   Interstate 80 Reconstruction

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	2195	veh/h	Peak-Hour Factor, PHF	0.97	
AADT		veh/day	%Trucks and Buses, P_T	12	
Peak-Hr Prop. of AADT, K			%RVs, P_R	1	
Peak-Hr Direction Prop, D			General Terrain:	Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length	mi	
			Up/Down %		

Calculate Flow Adjustments

f_p	0.95	E_R	2.0
E_T	2.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.840

Speed Inputs

			Calc Speed Adj and FFS		
Lane Width	12.0	ft			
Rt-Side Lat. Clearance	6.0	ft	f_{LW}	0.0	mph
Number of Lanes, N	2		f_{LC}	0.0	mph
Total Ramp Density, TRD	1.67	ramps/mi	TRD Adjustment	5.0	mph
FFS (measured)		mph	FFS	70.4	mph
Base free-flow Speed, BFFS	75.4	mph			

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   1417   pc/h/ln

S   69.5   mph

D = v_p / S   20.4   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	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	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*JRE*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 302 and 303*
Date Performed	*1/3/2014*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*Alt2A 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*4559*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*13*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.830*

Speed Inputs

			### Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures

Design (N)

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *2981* pc/h/ln

S	*33.2*	mph
D = v_p / S	*89.8*	pc/mi/ln
LOS	*F*	

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 speed	BFFS - Base free-flow
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	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	JRE		
Agency or Company	AECOM		
Date Performed	8/1/2013		
Analysis Time Period	A.M. Peak Hour		

Project Description   Interstate 80 Reconstruction

Site Information

Highway/Direction of Travel	I-80 Westbound
From/To	Between Ints. 303 and 304
Jurisdiction	
Analysis Year	Alt2A 2045

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	2128	veh/h	Peak-Hour Factor, PHF	0.97	
AADT		veh/day	%Trucks and Buses, P_T	12	
Peak-Hr Prop. of AADT, K			%RVs, P_R	1	
Peak-Hr Direction Prop, D			General Terrain:	Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length	mi	
			Up/Down %		

Calculate Flow Adjustments

f_p	0.95		E_R	2.0
E_T	2.5		$f_{HV} = 1/[1+P_T(E_T-1) + P_R(E_R-1)]$	0.840

Speed Inputs

Lane Width	12.0	ft
Rt-Side Lat. Clearance	6.0	ft
Number of Lanes, N	3	
Total Ramp Density, TRD	1.67	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	75.4	mph

Calc Speed Adj and FFS

f_{LW}	0.0	mph
f_{LC}	0.0	mph
TRD Adjustment	5.0	mph
FFS	70.4	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	916	pc/h/ln
S	70.0	mph
D = v_p / S	13.1	pc/mi/ln
LOS	B	

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	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	*JRE*		Highway/Direction of Travel	*I-80 Westbound*	
Agency or Company	*AECOM*		From/To	*Between Ints. 303 and 304*	
Date Performed	*1/3/2014*		Jurisdiction		
Analysis Time Period	*P.M. Peak Hour*		Analysis Year	*Alt2A 2045*	

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*4440*	veh/h	Peak-Hour Factor, PHF	*0.97*	
AADT		veh/day	%Trucks and Buses, P_T	*13*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*	
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.830*	

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*3*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

LOS and Performance Measures			Design (N)		
<u>Operational (LOS)</u>			<u>Design (N)</u>		
			Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1935*	pc/h/ln	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*63.7*	mph	S		mph
D = v_p / S	*30.4*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*D*		Required Number of Lanes, N		

Glossary / Factor Location

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			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*		
Analyst	*JRE*	Highway/Direction of Travel	*I-80 Westbound*	
Agency or Company	*AECOM*	From/To	*Between Ints. 304 and 305*	
Date Performed	*8/1/2013*	Jurisdiction		
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*Alt2A 2045*	

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*1798*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs

			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*3*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures

			Design (N)		
Operational (LOS)			Design (N)		
			Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*790*	pc/h/ln	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*70.0*	mph	S		mph
D = v_p / S	*11.3*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*B*		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	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*JRE*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 304 and 305*
Date Performed	*8/1/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*Alt2A 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*3865*	veh/h	Peak-Hour Factor, PHF	*0.97*	
AADT		veh/day	%Trucks and Buses, P_T	*13*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.830*

Speed Inputs

			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*3*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures

Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   *1685*   pc/h/ln

S	*67.3*	mph
D = v_p / S	*25.0*	pc/mi/ln
LOS	*C*	

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	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	*JRE*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints 307 to 305*
Date Performed	*8/1/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*Alt 2A 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*3240*	veh/h	Peak-Hour Factor, PHF	*0.93*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*4*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.50*	ramps/mi	TRD Adjustment	*4.5*	mph
FFS (measured)		mph	FFS	*70.9*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *1091*   pc/h/ln

S	*70.0*	mph
D = v_p / S	*15.6*	pc/mi/ln
LOS	*B*	

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 / Factor Location

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	JRE
Agency or Company	AECOM
Date Performed	8/1/2013
Analysis Time Period	P.M. Peak Hour

Project Description   Interstate 80 Reconstruction

Site Information

Highway/Direction of Travel	I-80 Westbound
From/To	Between Ints 307 and 305
Jurisdiction	
Analysis Year	Alt2A 2045

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	6750	veh/h	Peak-Hour Factor, PHF	0.96	
AADT		veh/day	%Trucks and Buses, P_T	13	
Peak-Hr Prop. of AADT, K			%RVs, P_R	1	
Peak-Hr Direction Prop, D			General Terrain:	Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length	mi	
			Up/Down %		

Calculate Flow Adjustments

f_p	0.95	E_R	2.0	
E_T	2.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.830	

Speed Inputs

Lane Width	12.0	ft
Rt-Side Lat. Clearance	6.0	ft
Number of Lanes, N	4	
Total Ramp Density, TRD	1.50	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	75.4	mph

Calc Speed Adj and FFS

f_{LW}	0.0	mph
f_{LC}	0.0	mph
TRD Adjustment	4.5	mph
FFS	70.9	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2230	pc/h/ln
S	57.7	mph
D = v_p / S	38.7	pc/mi/ln
LOS	E	

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	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service speed	BFFS - Base free-flow
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	

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