

APPENDIX B

FREEWAY SEGMENT

LEVELS OF SERVICE HCS OUTPUT

GENERAL PURPOSE LANES

BUILD

NORTHBOUND

LEVELS OF SERVICE HCS OUTPUT

BASIC FREEWAY SEGMENTS WORKSHEET																										
			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Begin to Valwood off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes, Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10839</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2445</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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General Information			Site Information																							
Analyst		LWC		Highway/Direction of Travel																						
Agency or Company		CAI		From/To																						
Date Performed		2/25/2009		Jurisdiction																						
Analysis Time Period		DHV		Analysis Year																						
Project Description		General Purpose Lanes Northbound																								
☒ Oper.(LOS)			☐ Des.(N)		☐ Planning Data																					
Flow Inputs																										
Volume, V		9662		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				%Trucks and Buses, P_T																						
DDHV = AADT x K x D				%RVs, P_R																						
Driver type adjustment		1.00		General Terrain:																						
				Grade % Length																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		$f_{HV} = 1/[1 + P_T(E_T - 1) + P_R(E_R - 1)]$																						
				1.2																						
				0.985																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		1.00		l/mi																						
Number of Lanes, N		5																								
FFS (measured)				mi/h																						
Base free-flow Speed, BFFS		70.0		mi/h																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
S			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
$D = v_p / S$			S																							
LOS			$D = v_p / S$																							
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N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>ValleyView_on_to_Valwood_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Farmers Branch</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10405</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2934</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
			f_{LC} - Exhibit 23-5																							
			f_N - Exhibit 23-6																							
			f_{ID} - Exhibit 23-7																							

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		LWC	Highway/Direction of Travel		Northbound																					
Agency or Company		CAI	From/To		Belline Off to Whitlock Off																					
Date Performed		2/25/2009	Jurisdiction		Carrollton																					
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description General Purpose Lanes Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		10422	veh/h	Peak-Hour Factor, PHF	0.90																					
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:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		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			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		4		f_N	1.5 mi/h																					
FFS (measured)			mi/h	FFS	66.0 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
S			S																							
$D = v_p / S$			$D = v_p / S$																							
LOS			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET

Application	Input	Output
Operational (LOS)	FFS, N , v_p	LOS, S , D
Design (N)	FFS, LOS, v_p	N , S , D
Design (v_p)	FFS, LOS, N	v_p , S , D
Planning (LOS)	FFS, N , AADT	LOS, S , D
Planning (N)	FFS, LOS, AADT	N , S , D
Planning (v_p)	FFS, LOS, N	v_p , S , D

Site Information

Project Description	General Purpose Lanes	Northbound
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Planning Data

Volume, V	9750	veh/h	Peak-Hour Factor, PHF	0.90
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:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

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

Calc Speed Adj and FFS

Lane Width	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	1.00	l/mi	f_{ID}	2.5	mi/h
Number of Lanes, N	4		f_N	1.5	mi/h
FFS (measured)		mi/h	FFS	66.0	mi/h
Base free-flow Speed, BEFS	70.0	mi/h			

	Design (N)
Control	10
Experimental	10

Operational (LOS)			Design (N)		
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2749	pc/h/ln	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		pc/h
S		mi/h	S		mi/h
$D = v_p / S$		pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	F		Required Number of Lanes, N		

Factor	Location
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

N - Number of lanes	S - Speed	E_R - Exhibits 23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Belline On to Dickerson Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Carrollton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10856</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2449</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Dickerson_off to SH 190_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes, Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10051</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2834</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH 190_Off_to_Frankford_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5928</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$ <i>2228</i> pc/h/ln			$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>56.0</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>39.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Frankford_Off_to_Frankford_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5132</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1929</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.2</i> mi/h			S mi/h																							
$D = v_p / S$ <i>31.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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Volume, V		5132		veh/h																						
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Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				0.90																						
DDHV = AADT x K x D				%Trucks and Buses, P_T																						
Driver type adjustment		1.00		3																						
				%RVs, P_R																						
				0																						
				General Terrain:																						
				Level																						
				Grade % Length																						
				mi																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		1.2																						
				$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.985																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		1.00		l/mi																						
Number of Lanes, N		3																								
FFS (measured)				mi/h																						
Base free-flow Speed, BFFS		70.0		mi/h																						
				f_{LW}																						
				0.0																						
				mi/h																						
				f_{LC}																						
				0.0																						
				mi/h																						
				f_{ID}																						
				2.5																						
				mi/h																						
				f_N																						
				3.0																						
				mi/h																						
				FFS																						
				64.5																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1929																										
S			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
62.2			pc/h																							
$D = v_p / S$			S																							
31.0			mi/h																							
LOS			$D = v_p / S$																							
D			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 23-8, 23-10																							
			f_{LW} - Exhibit 23-4																							
			E_T - Exhibits 23-8, 23-10, 23-11																							
			f_{LC} - Exhibit 23-5																							
			f_p - Page 23-12																							
			f_N - Exhibit 23-6																							
			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
			f_{ID} - Exhibit 23-7																							

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Frankford On/FM 3040 Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6503</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2445</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM3040_Off_to_SH 121 ON</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5547</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2085</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>59.5</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>35.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET

The graph illustrates the relationship between Average Passenger-Car Speed (v_p) and Flow Rate (q) for different levels of service (LOS) and density values. The curves represent the performance of a freeway segment under various conditions.

Application	Input	Output
Operational (LOS)	FFS, N , v_p	LOS, S , D
Design (N)	FFS, LOS, v_p	N , S , D
Design (v_p)	FFS, LOS, N	v_p , S , D
Planning (LOS)	FFS, N , AADT	LOS, S , D
Planning (M)	FFS, LOS, AADT	N , S , D
Planning (v_p)	FFS, LOS, N	v_p , S , D

Site Information

Project Description	General Purpose Lanes	Northbound
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Volume, V	9369	veh/h	Peak-Hour Factor, PHF	0.90
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:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

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

Calc Speed Adj and FFS

Lane Width	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	1.00	l/mi	f_{ID}	2.5	mi/h
Number of Lanes, N	5		f_N	0.0	mi/h
FFS (measured)		mi/h	FFS	67.5	mi/h
Base free-flow Speed, BEFS	70.0	mi/h			

Design (N)

Operational (LOS)			Design (N)		
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2113	pc/h/ln	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		pc/h
S	60.8	mi/h	S		mi/h
$D = v_p / S$	34.7	pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	D		Required Number of Lanes, N		

Factor	Location
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
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21	21
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81	81
82	82
83	83
84	84
85	85
86	86
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90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

N - Number of lanes	S - Speed	E_R - Exhibits 23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET																										
			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>HOV_Offto Bus 121_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9201</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured)		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2075</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>61.7</i> mi/h			S mi/h																							
$D = v_p / S$ <i>33.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Bus 121_off_to_Corporate_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7998</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2255</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>56.0</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>40.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corporate_On_to_FM1171_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes, Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8785</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured)		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1982</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.5</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>31.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM1171_off_to_Fox_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7130</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2010</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.0</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>32.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Regions A through F are marked for different levels of service (LOS).			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley_off_FM1171_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7395</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2085</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>60.5</i> mi/h			S mi/h																							
$D = v_p / S$ <i>34.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Design (v_p)	FFS, LOS, N	v_p , S, D																								
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Analyst		LWC		Highway/Direction of Travel																						
Agency or Company		CAI		Northbound																						
Date Performed		2/25/2009		From/To																						
Analysis Time Period		DHV		Lake_off_Valley_On																						
Analysis Year		2030		Jurisdiction																						
Project Description General Purpose Lanes Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		7457		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				0.90																						
DDHV = AADT x K x D				%Trucks and Buses, P_T																						
Driver type adjustment		1.00		3																						
				%RVs, P_R																						
				0																						
				General Terrain:																						
				Level																						
				Grade % Length																						
				mi																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		1.2																						
				$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.985																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		1.00		l/mi																						
Number of Lanes, N		4																								
FFS (measured)				mi/h																						
Base free-flow Speed, BFFS		70.0		mi/h																						
				f_{LW}																						
				0.0																						
				mi/h																						
				f_{LC}																						
				0.0																						
				mi/h																						
				f_{ID}																						
				2.5																						
				mi/h																						
				f_N																						
				1.5																						
				mi/h																						
				FFS																						
				66.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
2102			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
60.1			mi/h																							
mi/h			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
35.0			pc/mi/ln																							
pc/mi/ln			pc/mi/ln																							
LOS			D																							
D			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 23-8, 23-10																							
			f _{LW} - Exhibit 23-4																							
			E _T - Exhibits 23-8, 23-10, 23-11																							
			f _{LC} - Exhibit 23-5																							
			f _p - Page 23-12																							
			f _N - Exhibit 23-6																							
			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
			f _{ID} - Exhibit 23-7																							

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Garden_Off_LakePark_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7439</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2097</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>60.2</i> mi/h			S mi/h																							
$D = v_p / S$ <i>34.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>LakePark_On_Denton_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8120</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2289</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>54.9</i> mi/h			S mi/h																							
$D = v_p / S$ <i>41.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>S_Denton_off_to_Hundley_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes, Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7571</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2135</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>59.3</i> mi/h			S mi/h																							
$D = v_p / S$ <i>36.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Hundley_off_to_HOV_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6208</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1750</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.1</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>26.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
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LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET

The graph plots Average Passenger-Car Speed (v_p) in mi/h on the y-axis (30 to 80) against Flow Rate (q) in pc/h/ln on the x-axis (0 to 2400). Dashed curves represent different levels of service (LOS) and densities. Key points are marked for flow rates of 1300, 1450, 1600, 1750, and 2400 pc/h/ln. The speed decreases as flow rate increases, with a peak around 1600 pc/h/ln.

Flow Rate (q)	Speed (v_p)	Density (k)
1300	~72	~11 pc/mi
1450	~68	~16 pc/mi
1600	~62	~20 pc/mi
1750	~55	~25 pc/mi
2400	~50	~48 pc/mi

Analyst	LWC	Highway/Direction of Travel	Northbound
Agency or Company	CAI	From/To	HOV_On_Hundley_On
Date Performed	2/25/2009	Jurisdiction	
Analysis Time Period	DHV	Analysis Year	2030
Project Description General Purpose Lanes Northbound			
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data			

Volume, V	6659	veh/h	Peak-Hour Factor, PHF	0.90
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:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

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

Lane Width	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	1.00	l/mi	f_{ID}	2.5	mi/h
Number of Lanes, N	4		f_N	1.5	mi/h
FFS (measured)		mi/h	FFS	66.0	mi/h
Base free-flow Speed, BFFS	70.0	mi/h			

<u>Operational (LOS)</u>			<u>Design (N)</u>		
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1877	pc/h/ln	Design LOS		
S	63.9	mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		pc/h
$D = v_p / S$	29.4	pc/mi/ln	S		mi/h
LOS	D		$D = v_p / S$		pc/mi/ln
			Required Number of Lanes, N		

N - Number of lanes	S - Speed	E_R - Exhibits 23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Dobbs off to Swisher ON</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Carrollton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6783</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1922</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.3</i> mi/h			S mi/h																							
$D = v_p / S$ <i>30.3</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET

The graph illustrates the relationship between Average Passenger-Car Speed (v_p) and Flow Rate (q) for different levels of service (LOS) and density values. The curves represent the performance of a freeway segment under various conditions.

Application	Input	Output
Operational (LOS)	FFS, N , v_p	LOS, S , D
Design (N)	FFS, LOS, v_p	N , S , D
Design (v_p)	FFS, LOS, N	v_p , S , D
Planning (LOS)	FFS, N , AADT	LOS, S , D
Planning (M)	FFS, LOS, AADT	N , S , D
Planning (v_p)	FFS, LOS, N	v_p , S , D

Site Information

Project Description	General Purpose Lanes	Northbound
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Planning Data

Volume, V	7252	veh/h	Peak-Hour Factor, PHF	0.90
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:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

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

Calc Speed Adj and FFS

Lane Width	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	1.00	l/mi	f_{ID}	2.5	mi/h
Number of Lanes, N	4		f_N	1.5	mi/h
FFS (measured)		mi/h	FFS	66.0	mi/h
Base free-flow Speed, BEFS	70.0	mi/h			

Design (N)

$V_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$	2045	pc/h/ln
S	61.3	mi/h
$D = v_p / S$	33.4	pc/mi/ln
LOS	D	

Design LOS

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

Factor	Location
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
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34	34
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67	67
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79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

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 23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_n - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>HOV_Off_to_Post_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7057</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1990</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.3</i> mi/h			S mi/h																							
$D = v_p / S$ <i>31.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Post_Off_to_Corinth_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5871</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1655</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.6</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>25.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Mayhill_off_Post_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5738</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1618</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.8</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>24.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Loop288_off_to_Mayhill_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Carrollton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5367</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1513</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>66.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>22.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves representing Free-Flow Speed (FFS) for different levels of service (LOS A through F). Points are plotted on these curves at flow rates of 1300, 1450, 1600, and 1750 pc/h/ln. Density lines (10, 20, 30, 35, 45 pc/mi/ln) are also shown as dashed lines.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Application</th> <th style="text-align: left;">Input</th> <th style="text-align: left;">Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US77_off_to_Teasley_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5455</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1546</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.9</i> mi/h			S mi/h																							
$D = v_p / S$ <i>23.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley_off_to_HOV_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5190</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1471</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>66.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>22.3</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
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Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
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Project Description <i>General Purpose Lanes, Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5349</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1516</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>66.0</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>23.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US77_On_to_FtWorth_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6543</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured)		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1483</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>67.5</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>22.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FtWorth_off_HOV_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5773</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2181</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>57.3</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>38.1</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>HOV_Off_Teasley_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5596</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2114</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>58.9</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>35.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>McCormick_off_FortWorth_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5649</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2134</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>58.4</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>36.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		LWC	Highway/Direction of Travel		Northbound																					
Agency or Company		CAI	From/To		N.Texas_off_BonnieB_Off_																					
Date Performed		2/25/2009	Jurisdiction																							
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description General Purpose Lanes Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		5985	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	4																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
Peak-Hr Direction Prop, D				General Terrain:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R	1.2																					
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.980																					
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		3		f_N	3.0 mi/h																					
FFS (measured)			mi/h	FFS	64.5 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		2261 pc/h/ln	v_p		pc/h																					
S		55.0 mi/h	S		mi/h																					
$D = v_p / S$		41.1 pc/mi/ln	$D = v_p / S$		pc/mi/ln																					
LOS		E	Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>BonnieB_Off_to_IH35DC</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5003</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1890</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.6</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>30.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>IH35DC_to_Oak_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3764</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1422</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.5</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>22.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Oak_off_to_BonnieB_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3543</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1338</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.5</i> mi/h			S mi/h																							
$D = v_p / S$ <i>20.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>BonnieB_On_to_IH35DC</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3720</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1405</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.5</i> mi/h			S mi/h																							
$D = v_p / S$ <i>21.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves representing Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent Level of Service (LOS) boundaries from A to F. Density lines are also shown for 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A, B, C, D, and E are marked on the graph.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Application</th> <th style="text-align: left;">Input</th> <th style="text-align: left;">Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>IH35DC_to_US380_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6746</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>6</i>		f_N <i>0.0</i> mi/h																								
FFS (measured)		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1274</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>67.5</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>18.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows five Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Regions A through F are marked for different Levels of Service (LOS).			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Oak_On_to_end</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5268</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured)		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1194</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>67.5</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>17.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

MANAGED LANES

BUILD

NORTHBOUND

LEVELS OF SERVICE HCS OUTPUT

BASIC FREEWAY SEGMENTS WORKSHEET																										
			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>End of Project to Crosby Exit</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>2185</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1232</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>19.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Crosby Exit to Beltline Ent</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1583</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>893</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>14.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Beltline Ent to SH121_exit</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>2530</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1427</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>22.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH121_exit to_corprate_off</i>																								
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Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1114</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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LOS and Performance Measures			Design (N)																							
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>628</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i></i> pc/h																							
S <i>63.0</i> mi/h			S <i></i> mi/h																							
$D = v_p / S$ <i>10.0</i> pc/mi/ln			$D = v_p / S$ <i></i> pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
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FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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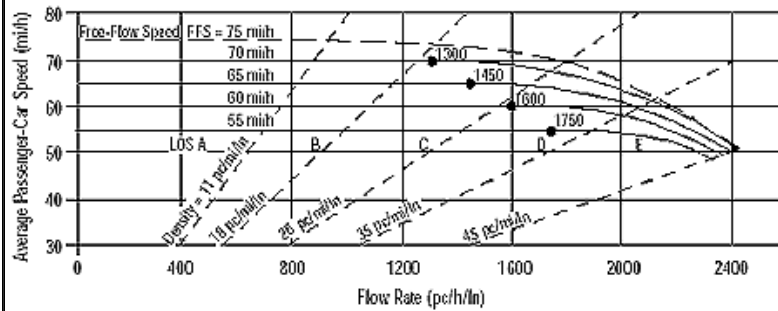
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Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>415</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>234</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>3.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH 121 On_to_Corporate_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1698</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>957</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>15.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corporate_On_to_Valley_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1866</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1052</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>16.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley_off to Valley On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1061</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>598</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>9.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p , S, D

General Information

Analyst *LWC*
 Agency or Company *CAI*
 Date Performed *2/25/2009*
 Analysis Time Period *DHV*

Site Information

Highway/Direction of Travel *Northbound*
 From/To *Valley Ridge_On_Lake Park_On*
 Jurisdiction
 Analysis Year *2030*

Project Description *Managed Lanes_Northbound*

☒ Oper.(LOS)

☐ Des.(N)

☐ Planning Data

Flow Inputs

Volume, V *1114* veh/h Peak-Hour Factor, PHF *0.90*
 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: *Level*
 DDHV = AADT x K x D veh/h Grade % Length *mi*
 Driver type adjustment *1.00* 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 *12.0* ft
 Rt-Shoulder Lat. Clearance *6.0* ft
 Interchange Density *1.00* l/mi
 Number of Lanes, N *2*
 FFS (measured) mi/h
 Base free-flow Speed, BFFS *70.0* mi/h

Calc Speed Adj and FFS

f_{LW} *0.0* mi/h
 f_{LC} *0.0* mi/h
 f_{ID} *2.5* mi/h
 f_N *4.5* mi/h
 FFS *63.0* mi/h

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *628* pc/h/ln
 S *63.0* mi/h
 $D = v_p / S$ *10.0* pc/mi/ln
 LOS *A*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h
 S mi/h
 $D = v_p / S$ 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 23-8, 23-10 f_{LW} - Exhibit 23-4
 E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5
 f_p - Page 23-12 f_N - Exhibit 23-6
 LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Lake Park_On_Hundley_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes_Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1441</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>813</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>12.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Hundley_off_tp_Swisher_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>981</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
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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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>553</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>8.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
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Flow Inputs																										
Volume, V <i>530</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Agency or Company <i>CAI</i>		From/To <i>Dobbs_On_Loop288_off</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>725</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Volume, V <i>424</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>239</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>3.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US77_Off_to_Teasly_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>229</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>129</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>2.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley_off_to_Teasley_ON</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>70</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Driver type adjustment <i>1.00</i>		Up/Down %																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>39</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>0.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley_On_to_SH35DC</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>247</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>139</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>2.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
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D - Density			f_N - Exhibit 23-6																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH35DC_to_end</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>380</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>214</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>3.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
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S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

GENERAL PURPOSE LANES

BUILD

SOUTHBOUND

LEVELS OF SERVICE HCS OUTPUT

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>End to Oak Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5406</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1225</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>67.5</i> mi/h			S mi/h																							
$D = v_p / S$ <i>18.1</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Oak Off to US 380_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5079</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured)		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1151</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>67.5</i> mi/h			S mi/h																							
$D = v_p / S$ <i>17.1</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>IH 35DC to Bonnie_B_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes <u>Southbound</u>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>4000</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1504</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.5</i> mi/h			S mi/h																							
$D = v_p / S$ <i>23.3</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Bonnie_B_Off_to_IH35W_DC</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3841</i>		veh/h		Peak-Hour Factor, PHF <i>0.90</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>																						
Driver type adjustment <i>1.00</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 <i>12.0</i>		ft		f_{LW} <i>0.0</i> mi/h																						
Rt-Shoulder Lat. Clearance <i>6.0</i>		ft		f_{LC} <i>0.0</i> mi/h																						
Interchange Density <i>1.00</i>		l/mi		f_{ID} <i>2.5</i> mi/h																						
Number of Lanes, N <i>3</i>				f_N <i>3.0</i> mi/h																						
FFS (measured)		mi/h		FFS <i>64.5</i> mi/h																						
Base free-flow Speed, BFFS <i>70.0</i>		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p <i>1444</i>		pc/h/ln		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
f_p				pc/h																						
S <i>64.5</i>		mi/h		S <i>mi/h</i>																						
$D = v_p / S$		<i>22.4</i>		$D = v_p / S$																						
LOS <i>C</i>		pc/mi/ln		pc/mi/ln																						
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
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				f_{ID} - Exhibit 23-7																						

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>IH 35WDC to N. Texas On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5018</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1886</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.7</i> mi/h			S mi/h																							
$D = v_p / S$ <i>30.1</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Off ramp to FTW_to_Mc_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5743</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2159</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>57.8</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>37.3</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley_off to HOV_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5266</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT <i></i> veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K <i></i>		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D <i></i>		General Terrain: <i>Level</i>																								
DDHV = AADT x K x D <i></i> veh/h		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down % <i></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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) <i></i> mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1980</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i></i> pc/h																							
S <i>61.4</i> mi/h			S <i></i> mi/h																							
$D = v_p / S$ <i>32.2</i> pc/mi/ln			$D = v_p / S$ <i></i> pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N <i></i>																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		LWC		Highway/Direction of Travel																						
Agency or Company		CAI		From/To																						
Date Performed		2/25/2009		Jurisdiction																						
Analysis Time Period		DHV		Analysis Year																						
Project Description		General Purpose Lanes Southbound																								
☒ Oper.(LOS)			☐ Des.(N)		☐ Planning Data																					
Flow Inputs																										
Volume, V		5399		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				%Trucks and Buses, P_T																						
DDHV = AADT x K x D				%RVs, P_R																						
Driver type adjustment		1.00		General Terrain:																						
				Grade % Length																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
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Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		1.00		l/mi																						
Number of Lanes, N		3																								
FFS (measured)				mi/h																						
Base free-flow Speed, BFFS		70.0		mi/h																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
2030			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
60.6			mi/h																							
D = v_p / S			D = v_p / S																							
33.5			pc/mi/ln																							
LOS			D																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
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v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
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Application	Input	Output																								
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Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>HOV_off_to_FTW_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5213</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1960</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>61.7</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>31.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
				f_{ID} - Exhibit 23-7																						

BASIC FREEWAY SEGMENTS WORKSHEET

Application	Input	Output
Operational (LOS)	FFS, N , v_p	LOS, S , D
Design (N)	FFS, LOS, v_p	N , S , D
Design (v_p)	FFS, LOS, N	v_p , S , D
Planning (LOS)	FFS, N , AADT	LOS, S , D
Planning (N)	FFS, LOS, AADT	N , S , D
Planning (v_p)	FFS, LOS, N	v_p , S , D

General Information		Site Information	
Analyst	LWC	Highway/Direction of Travel	Southbound
Agency or Company	CAI	From/To	Fort Worth On to US 377 Off
Date Performed	2/25/2009	Jurisdiction	Denton
Analysis Time Period	DHV	Analysis Year	2030
Project Description General Purpose Lanes Southbound			
☒ Oper.(LOS)		☐ Des.(N)	☐ Planning Data

Volume, V	6018	veh/h	Peak-Hour Factor, PHF	0.90
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:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

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	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	1.00	l/mi	f_{ID}	2.5	mi/h
Number of Lanes, N	4		f_N	1.5	mi/h
FFS (measured)		mi/h	FFS	66.0	mi/h
Base free-flow Speed, BFFS	70.0	mi/h			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1697	pc/h/ln	Design LOS	
S	65.4	mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	25.9	pc/mi/ln	S	mi/h
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 23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET																										
			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Application</th> <th style="text-align: left;">Input</th> <th style="text-align: left;">Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US77_off_to_Teasley_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>4815</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1358</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>66.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>20.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density thresholds: 11, 18, 26, 35, 45 pc/mi/ln. Regions A through F are marked for different levels of service (LOS).			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley_On_to_US_77_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes <u>Southbound</u>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5080</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1432</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>66.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>21.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US_77_On_to_Mayhill_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes <i>Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5921</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1669</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.6</i> mi/h			S mi/h																							
$D = v_p / S$ <i>25.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Mayhill_off to Loop 288</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5247</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1479</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>66.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>22.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Post Oak Off_toMayhill_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5903</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1664</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.6</i> mi/h			S mi/h																							
$D = v_p / S$ <i>25.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		LWC	Highway/Direction of Travel		Southbound																					
Agency or Company		CAI	From/To		Corinth Off_to_Post Oak_on																					
Date Performed		4/2009	Jurisdiction		Denton																					
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6700	veh/h	Peak-Hour Factor, PHF	0.90																					
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:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		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			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		4		f_N	1.5 mi/h																					
FFS (measured)			mi/h	FFS	66.0 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1889 pc/h/ln	v_p		pc/h																					
S		63.8 mi/h	S		mi/h																					
$D = v_p / S$		29.6 pc/mi/ln	$D = v_p / S$		pc/mi/ln																					
LOS		D	Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Meadow_off_to_Swisher_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7621</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2149</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>59.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>36.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Swisher_off_to_Dobbs_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6975</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1967</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.7</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>31.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Swisher_off_to_Dobbs_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6975</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1967</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.7</i> mi/h			S mi/h																							
$D = v_p / S$ <i>31.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Hundley_off_HOV_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description General Purpose Lanes <u>Southbound</u>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6895</i>		veh/h		Peak-Hour Factor, PHF <i>0.90</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>																						
Driver type adjustment <i>1.00</i>				Up/Down %																						
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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 <i>12.0</i>		ft		f_{LW} <i>0.0</i> mi/h																						
Rt-Shoulder Lat. Clearance <i>6.0</i>		ft		f_{LC} <i>0.0</i> mi/h																						
Interchange Density <i>1.00</i>		l/mi		f_{ID} <i>2.5</i> mi/h																						
Number of Lanes, N <i>4</i>				f_N <i>1.5</i> mi/h																						
FFS (measured)		mi/h		FFS <i>66.0</i> mi/h																						
Base free-flow Speed, BFFS <i>70.0</i>		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p <i>1944</i>		pc/h/ln		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
f_p				pc/h																						
S <i>63.0</i>		mi/h		f_p																						
D = v_p / S		<i>30.8</i>		mi/h																						
LOS <i>D</i>		pc/mi/ln		D = v_p / S																						
				pc/mi/ln																						
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
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LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
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Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>HOV_off_to_Swisher_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction <i>Denton</i>																								
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Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6373</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1797</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.7</i> mi/h			S mi/h																							
$D = v_p / S$ <i>27.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
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FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7585</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2139</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>59.2</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>36.1</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8204</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2313</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>54.1</i> mi/h			S mi/h																							
$D = v_p / S$ <i>42.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Highland_Off_to_FM407_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8054</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2271</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>55.5</i> mi/h			S mi/h																							
$D = v_p / S$ <i>40.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM407_Off_to_Garden_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7532</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2124</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>59.6</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>35.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Garden_On_Valley_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8107</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1829</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>65.6</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>27.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley_off_to_FM1171_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7771</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2191</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>57.9</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>37.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		LWC		Highway/Direction of Travel																						
Agency or Company		CAI		Southbound																						
Date Performed		2/25/2009		From/To																						
Analysis Time Period		DHV		Jurisdiction																						
				Analysis Year																						
				2030																						
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6700		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				0.90																						
DDHV = AADT x K x D				%Trucks and Buses, P_T																						
Driver type adjustment		1.00		3																						
				%RVs, P_R																						
				0																						
				General Terrain:																						
				Level																						
				Grade % Length																						
				mi																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
E_T		1.5		1.2																						
				$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$																						
				0.985																						
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		1.00		l/mi																						
Number of Lanes, N		4																								
FFS (measured)				mi/h																						
Base free-flow Speed, BFFS		70.0		mi/h																						
				f_{LW}																						
				0.0																						
				mi/h																						
				f_{LC}																						
				0.0																						
				mi/h																						
				f_{ID}																						
				2.5																						
				mi/h																						
				f_N																						
				1.5																						
				mi/h																						
				FFS																						
				66.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
1889			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
S			S																							
63.8			mi/h																							
mi/h			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
29.6			pc/mi/ln																							
pc/mi/ln			pc/mi/ln																							
LOS			D																							
D			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 23-8, 23-10																							
			f _{LW} - Exhibit 23-4																							
			E _T - Exhibits 23-8, 23-10, 23-11																							
			f _{LC} - Exhibit 23-5																							
			f _p - Page 23-12																							
			f _N - Exhibit 23-6																							
			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
			f _{ID} - Exhibit 23-7																							

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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley_On_to_FM1171_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8301</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2340</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>53.2</i> mi/h			S mi/h																							
$D = v_p / S$ <i>44.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>BUS121_off_Fox_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8088</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2280</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>55.2</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>41.3</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corporate_Off_to_HOV_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8247</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2325</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i></i> pc/h																							
S <i>53.7</i> mi/h			S <i></i> mi/h																							
$D = v_p / S$ <i>43.3</i> pc/mi/ln			$D = v_p / S$ <i></i> pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>HOV_On_to_BUS121_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8433</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured)		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1902</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>64.7</i> mi/h			S mi/h																							
$D = v_p / S$ <i>29.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Hebron_off_to_FM3040_off_</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9035</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2038</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.4</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>32.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM3040_off_to_HOV_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5027</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1890</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.6</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>30.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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Date Performed <i>2/25/2009</i>		Jurisdiction																								
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Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>4744</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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S <i>63.6</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>28.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM3040_On_TO_Frankford_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6549</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2462</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S			S																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
			f_{LC} - Exhibit 23-5																							
			f_N - Exhibit 23-6																							
			f_{ID} - Exhibit 23-7																							

BASIC FREEWAY SEGMENTS WORKSHEET																										
			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		LWC	Highway/Direction of Travel		Southbound																					
Agency or Company		CAI	From/To		Frankford_off_to_on																					
Date Performed		2/25/2009	Jurisdiction																							
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description General Purpose Lanes Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		5001	veh/h	Peak-Hour Factor, PHF	0.90																					
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:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		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			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		3		f_N	3.0 mi/h																					
FFS (measured)			mi/h	FFS	64.5 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
v_p		1880 pc/h/ln	v_p		pc/h																					
S		62.7 mi/h	S		mi/h																					
$D = v_p / S$		30.0 pc/mi/ln	$D = v_p / S$		pc/mi/ln																					
LOS		D	Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Frankford_off_to_Frankford_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5001</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1880</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>62.7</i> mi/h			S mi/h																							
$D = v_p / S$ <i>30.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>D</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Frankford_On_SH190_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5912</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2222</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>56.1</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>39.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
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Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH190_On_to_Dickerson_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9973</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2249</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>57.1</i> mi/h			S mi/h																							
$D = v_p / S$ <i>39.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Dickerson_On_to_Beltline_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10539</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2377</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Beltline_Off_to_Whitlock_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9610</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2709</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET

Application	Input	Output
Operational (LOS)	FFS, N , v_p	LOS, S , D
Design (N)	FFS, LOS, v_p	N , S , D
Design (v_p)	FFS, LOS, N	v_p , S , D
Planning (LOS)	FFS, N , AADT	LOS, S , D
Planning (N)	FFS, LOS, AADT	N , S , D
Planning (v_p)	FFS, LOS, N	v_p , S , D

Site Information

Project Description	General Purpose Lanes	Southbound
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Planning Data

Volume, V	10477	veh/h	Peak-Hour Factor, PHF	0.90
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:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

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

Calc Speed Adj and FFS

Lane Width	12.0	ft	f_{LW}	0.0	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	f_{LC}	0.0	mi/h
Interchange Density	1.00	l/mi	f_{ID}	2.5	mi/h
Number of Lanes, N	4		f_N	1.5	mi/h
FFS (measured)		mi/h	FFS	66.0	mi/h
Base free-flow Speed, BEFS	70.0	mi/h			

Design (N)

Operational (LOS)			Design (N)		
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2954	pc/h/ln	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		pc/h
S		mi/h	S		mi/h
$D = v_p / S$		pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	F		Required Number of Lanes, N		

Factor	Location
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
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23	23
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92	92
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94	94
95	95
96	96
97	97
98	98
99	99
100	100

N - Number of lanes	S - Speed	E_R - Exhibits 23-8, 23-10	f_{LW} - Exhibit 23-4
V - Hourly volume	D - Density	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 23-12	f_N - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Beltline_On_Vallwood_Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11247</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>5</i>		f_N <i>0.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>67.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2537</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Vallwood_Off_to_ValleyV_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>General Purpose Lanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10468</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>4</i>		f_N <i>1.5</i> mi/h																								
FFS (measured)		FFS <i>66.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2951</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		LWC		Highway/Direction of Travel																						
Agency or Company		CAI		From/To																						
Date Performed		2/25/2009		Jurisdiction																						
Analysis Time Period		DHV		Analysis Year																						
Project Description		General Purpose Lanes, Southbound																								
☒ Oper.(LOS)			☐ Des.(N)		☐ Planning Data																					
Flow Inputs																										
Volume, V		9636		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				%Trucks and Buses, P_T																						
DDHV = AADT x K x D				%RVs, P_R																						
Driver type adjustment		1.00		General Terrain:																						
				Grade % Length																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
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		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		1.00		l/mi																						
Number of Lanes, N		4																								
FFS (measured)				mi/h																						
Base free-flow Speed, BFFS		70.0		mi/h																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
2717			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
pc/h/ln			pc/h																							
mi/h			mi/h																							
D = v_p / S			D = v_p / S																							
pc/mi/ln			pc/mi/ln																							
LOS			F																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
				f_{ID} - Exhibit 23-7																						

BASIC FREEWAY SEGMENTS WORKSHEET																														
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Application	Input	Output																												
Operational (LOS)	FFS, N, v_p	LOS, S, D																												
Design (N)	FFS, LOS, v_p	N, S, D																												
Design (v_p)	FFS, LOS, N	v_p , S, D																												
Planning (LOS)	FFS, N, AADT	LOS, S, D																												
Planning (N)	FFS, LOS, AADT	N, S, D																												
Planning (v_p)	FFS, LOS, N	v_p , S, D																												
General Information					Site Information																									
Analyst		LWC			Highway/Direction of Travel		Southbound																							
Agency or Company		CAI			From/To		Valwood_On_toend																							
Date Performed		2/25/2009			Jurisdiction		Denton																							
Analysis Time Period		DHV			Analysis Year		2030																							
Project Description General Purpose Lanes Southbound																														
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																														
Flow Inputs																														
Volume, V		10671 veh/h			Peak-Hour Factor, PHF		0.90																							
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:		Level																							
DDHV = AADT x K x D		veh/h			Grade % Length		mi																							
Driver type adjustment		1.00			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					Calc Speed Adj and FFS																									
Lane Width		12.0 ft			f_{LW}		0.0 mi/h																							
Rt-Shoulder Lat. Clearance		6.0 ft			f_{LC}		0.0 mi/h																							
Interchange Density		1.00 l/mi			f_{ID}		2.5 mi/h																							
Number of Lanes, N		5			f_N		0.0 mi/h																							
FFS (measured)		mi/h			FFS		67.5 mi/h																							
Base free-flow Speed, BFFS		70.0 mi/h																												
LOS and Performance Measures					Design (N)																									
Operational (LOS)					Design (N)																									
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$					$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																									
S					S																									
$D = v_p / S$					$D = v_p / S$																									
LOS					Required Number of Lanes, N																									
Glossary					Factor Location																									
N - Number of lanes		S - Speed			E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																							
V - Hourly volume		D - Density			E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																							
v_p - Flow rate		FFS - Free-flow speed			f_p - Page 23-12		f_N - Exhibit 23-6																							
LOS - Level of service		BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																														

MANAGED LANES

BUILD

SOUTHBOUND

LEVELS OF SERVICE HCS OUTPUT

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>End_to_IH35W_DCOff</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>416</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>235</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>3.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>IH35W_DCOff_to_Teasly_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>266</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>150</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>2.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasly_off_to_Teasly_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>133</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>75</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>1.2</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley_On_US77_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>319</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>180</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>2.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US77_On_to_Loop 288</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>Managed Lanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>363</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>205</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>3.3</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (k) at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Loop288_On to Corinth_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>726</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>409</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>6.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
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General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corinth_off_to_Swisher_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>407</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>230</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>3.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Swisher_On_to_Hundely_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1009</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>569</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>9.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Hundley_on_Lake_park_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1531</i>		veh/h		Peak-Hour Factor, PHF <i>0.90</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>																						
Driver type adjustment <i>1.00</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 <i>12.0</i>		ft		f_{LW} <i>0.0</i> mi/h																						
Rt-Shoulder Lat. Clearance <i>6.0</i>		ft		f_{LC} <i>0.0</i> mi/h																						
Interchange Density <i>1.00</i>		l/mi		f_{ID} <i>2.5</i> mi/h																						
Number of Lanes, N <i>2</i>				f_N <i>4.5</i> mi/h																						
FFS (measured)		mi/h		FFS <i>63.0</i> mi/h																						
Base free-flow Speed, BFFS <i>70.0</i>		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p <i>863</i>		pc/h/ln		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
f_p				pc/h																						
S <i>63.0</i>		mi/h		f_p																						
D = v_p / S		<i>13.7</i>		mi/h																						
LOS <i>B</i>		pc/mi/ln		S																						
			D = v_p / S																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
				f_{ID} - Exhibit 23-7																						

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>LakePark_off_ValleyRidge_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>991</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>559</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>8.9</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Regions A through F are marked for different Levels of Service (LOS).			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst LWC		Highway/Direction of Travel Southbound																								
Agency or Company CAI		From/To ValleyRidge_off_to_ValleyR_On																								
Date Performed 2/25/2009		Jurisdiction																								
Analysis Time Period DHV		Analysis Year 2030																								
Project Description ManagedLanes_Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V 885		veh/h		Peak-Hour Factor, PHF 0.90																						
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: Level																						
DDHV = AADT x K x D		veh/h		Grade % Length mi																						
Driver type adjustment 1.00				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			Calc Speed Adj and FFS																							
Lane Width 12.0		ft		f_{LW} 0.0																						
Rt-Shoulder Lat. Clearance 6.0		ft		f_{LC} 0.0																						
Interchange Density 1.00		l/mi		f_{ID} 2.5																						
Number of Lanes, N 2				f_N 4.5																						
FFS (measured)		mi/h		FFS 63.0																						
Base free-flow Speed, BFFS 70.0		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
v_p 499		pc/h/ln		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
S 63.0		mi/h		S 																						
$D = v_p / S$ 7.9		pc/mi/ln		$D = v_p / S$ 																						
LOS A				Required Number of Lanes, N																						
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
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				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
				f_{ID} - Exhibit 23-7																						

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley_On-Corporate_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1469</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>828</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>13.1</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corporate_off_to_FM3040_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1283</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>723</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>11.5</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM3040_off_to_Dickerson_off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1000</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>564</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>9.0</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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Agency or Company <i>CAI</i>		From/To <i>FM3040_off_to_Dickerson_off</i>																								
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Operational (LOS)			Design (N)																							
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Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Dickerson_On_to_BeltLine_off</i>																								
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Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>2389</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1347</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>21.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>BeltLine_off_to_Crosby_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>1389</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>783</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>12.4</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>B</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Crosby_On_to_end</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>2079</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>1172</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>18.6</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>C</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>LWC</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corinth_off_to_Swisher_On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>ManagedLanes_Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>407</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>230</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>63.0</i> mi/h			S mi/h																							
$D = v_p / S$ <i>3.7</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>A</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

FREEWAY LANES

NO-BUILD

NORTHBOUND

LEVELS OF SERVICE HCS OUTPUT

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Project End to Valley View On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>13024</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4896</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley View On/Valwood Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>13767</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5175</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
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Date Performed <i>2/25/2009</i>		Jurisdiction																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12590</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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DDHV = AADT x K x D veh/h		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4733</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valwood On/Crosby Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>13439</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5052</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Crosby Off/Beltline Off</i>																								
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Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12837</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4826</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
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LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12005</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4513</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Beltline On/Whitlock Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>14058</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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DDHV = AADT x K x D veh/h		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5285</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Flow Inputs																										
Volume, V <i>12626</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4746</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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Flow Inputs																										
Volume, V <i>13253</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4982</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows five Free-Flow Speed (FFS) curves: 75 mi/h, 70 mi/h, 65 mi/h, 60 mi/h, and 55 mi/h. Dashed lines represent density levels: 11 pc/mi/ln, 18 pc/mi/ln, 26 pc/mi/ln, 35 pc/mi/ln, 45 pc/mi/ln, and 55 pc/mi/ln. Regions A through F are marked on the graph.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Flow Inputs																										
Volume, V <i>11024</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
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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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3845</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>EB PGBT on/WB PGBT on</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12935</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4863</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S			S																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>WB PGBT on/Frankford On</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>14078</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5292</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Flow Inputs																										
Volume, V <i>14078</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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S mi/h			S mi/h																							
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Glossary			Factor Location																							
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Frankford On-SH121 Toll Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>14822</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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S mi/h			S mi/h																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH121 Toll Off-SH121 Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11654</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4381</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		EJP	Highway/Direction of Travel		IH 35E Northbound																					
Agency or Company		CAI	From/To		SH121 Off/FM3040 Off																					
Date Performed		2/25/2009	Jurisdiction																							
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description No Build Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		11211	veh/h	Peak-Hour Factor, PHF	0.90																					
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:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		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			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		3		f_N	3.0 mi/h																					
FFS (measured)			mi/h	FFS	64.5 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
S			S																							
$D = v_p / S$			$D = v_p / S$																							
LOS			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM3040 Off/SH121 On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10255</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3855</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH121 On/FM3040 On</i>																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11343</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4264</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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Application	Input	Output																								
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Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM3040 On/Corporate Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12431</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4673</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corporate Off/Corporate On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11113</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
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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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4178</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
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Flow Inputs																										
Volume, V <i>11900</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4474</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10697</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4021</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Flow Inputs																										
Volume, V <i>11457</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
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S mi/h			S mi/h																							
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Fox Off/FM 1171 Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11014</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4140</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>FM 1171 Off/Fox On</i>																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9802</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3685</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Fox On/Valley Ridge Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10245</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3851</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8502</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3196</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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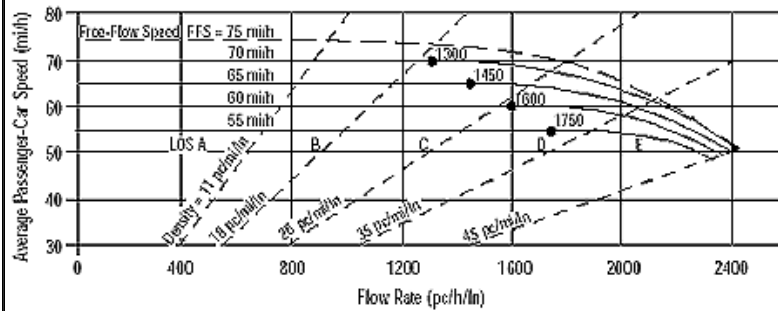
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		9254	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	3																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
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Operational (LOS)			Design (N)																							
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S			mi/h	S																						
$D = v_p / S$			pc/mi/ln	$D = v_p / S$																						
LOS		F		Required Number of Lanes, N																						
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10 E_T - Exhibits 23-8, 23-10, 23-11 f_p - Page 23-12 LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{LW} - Exhibit 23-4 f_{LC} - Exhibit 23-5 f_N - Exhibit 23-6 f_{ID} - Exhibit 23-7																					
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DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley Ridge On/Lake Park Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10032</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3771</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9342</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3512</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S			S																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>E Jones On/Lake Park On</i>																								
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Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9519</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3578</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p , S, D

General Information

Analyst *EJP*
 Agency or Company *CAI*
 Date Performed *2/25/2009*
 Analysis Time Period *DHV*
 Project Description *No Build Northbound*

Site Information

Highway/Direction of Travel *IH 35E Northbound*
 From/To *Lake Park On/Garden Ridge Off*
 Jurisdiction
 Analysis Year *2030*

☒ Oper.(LOS)☐ Des.(N)☐ Planning Data

Flow Inputs

Volume, V *10863* veh/h Peak-Hour Factor, PHF *0.90*
 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: *Level*
 DDHV = AADT x K x D veh/h Grade % Length *mi*
 Driver type adjustment *1.00* 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 *12.0* ft
 Rt-Shoulder Lat. Clearance *6.0* ft
 Interchange Density *1.00* l/mi
 Number of Lanes, N *3*
 FFS (measured) mi/h
 Base free-flow Speed, BFFS *70.0* mi/h

Calc Speed Adj and FFS

f_{LW} *0.0* mi/h
 f_{LC} *0.0* mi/h
 f_{ID} *2.5* mi/h
 f_N *3.0* mi/h
 FFS *64.5* mi/h

LOS and Performance Measures

Operational (LOS)
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ *4084* pc/h/ln
 S mi/h
 $D = v_p / S$ pc/mi/ln
 LOS *F*

Design (N)

Design (N)
 Design LOS
 $v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h
 S mi/h
 $D = v_p / S$ 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 23-8, 23-10 f_{LW} - Exhibit 23-4
 E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5
 f_p - Page 23-12 f_N - Exhibit 23-6
 LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7

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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9607</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Garden Ridge On/S Denton Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description ☐ No Build ☒ Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10359</i>		veh/h		Peak-Hour Factor, PHF <i>0.90</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>																						
Driver type adjustment <i>1.00</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 <i>12.0</i>		ft		f_{LW} <i>0.0</i> mi/h																						
Rt-Shoulder Lat. Clearance <i>6.0</i>		ft		f_{LC} <i>0.0</i> mi/h																						
Interchange Density <i>1.00</i>		l/mi		f_{ID} <i>2.5</i> mi/h																						
Number of Lanes, N <i>3</i>				f_N <i>3.0</i> mi/h																						
FFS (measured)		mi/h		FFS <i>64.5</i> mi/h																						
Base free-flow Speed, BFFS <i>70.0</i>		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3894</i>		pc/h/ln		Design LOS																						
S		mi/h		$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																						
$D = v_p / S$		pc/mi/ln		S mi/h																						
LOS <i>F</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 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9012</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5082</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
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Glossary			Factor Location																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
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D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7189</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4054</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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Flow Inputs																										
Volume, V <i>8587</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
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Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4538</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
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Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Dobbs On/Corinth Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8224</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4637</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Agency or Company <i>CAI</i>		From/To <i>Corinth Off/On</i>																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7959</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4488</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
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Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8543</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4817</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
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LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Free-Flow Speed: FFS = 75 mi/h, 70 mi/h, 65 mi/h, 60 mi/h, 55 mi/h Level of Service: LOS A, B, C, D, E Density: 11 pc/mi/ln, 18 pc/mi/ln, 26 pc/mi/ln, 35 pc/mi/ln, 45 pc/mi/ln Average Passenger-Car Speed (mi/h) Flow Rate (pc/h/ln)			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		7357	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	3																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
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D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Design (N)	FFS, LOS, v_p	N, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Post Oak On/Mayhill Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7729</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4358</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Flow Inputs																										
Volume, V <i>6835</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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S			S																							
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S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
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Glossary			Factor Location																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Flow Inputs																										
Volume, V <i>6578</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
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S <i>mi/h</i>			S <i>mi/h</i>																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4213</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US77 Off-On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6578</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3709</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US77 On/Teasley Off</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6878</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3878</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
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v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley Off/On</i>																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6613</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3729</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley On/Fort Worth Dr Off</i>																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7480</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>3</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4218</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S			S																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
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BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Fort Worth Dr Off/On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6710</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3784</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		EJP		Highway/Direction of Travel																						
Agency or Company		CAI		From/To																						
Date Performed		2/25/2009		Jurisdiction																						
Analysis Time Period		DHV		Analysis Year																						
Project Description		No Build Northbound																								
☒ Oper.(LOS)		☐ Des.(N)		☐ Planning Data																						
Flow Inputs																										
Volume, V		7471		veh/h																						
AADT				veh/day																						
Peak-Hr Prop. of AADT, K				Peak-Hour Factor, PHF																						
Peak-Hr Direction Prop, D				%Trucks and Buses, P_T																						
DDHV = AADT x K x D				%RVs, P_R																						
Driver type adjustment		1.00		General Terrain:																						
				Grade % Length																						
				Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R																						
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		12.0		ft																						
Rt-Shoulder Lat. Clearance		6.0		ft																						
Interchange Density		1.00		l/mi																						
Number of Lanes, N		2																								
FFS (measured)				mi/h																						
Base free-flow Speed, BFFS		70.0		mi/h																						
				FFS																						
				63.0																						
				mi/h																						
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			Design LOS																							
S			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
D = v_p / S			S																							
LOS			D = v_p / S																							
F			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			S - Speed																							
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v_p - Flow rate			FFS - Free-flow speed																							
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			E _R - Exhibits 23-8, 23-10																							
			E _T - Exhibits 23-8, 23-10, 23-11																							
			f _p - Page 23-12																							
			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
			f _{LW} - Exhibit 23-4																							
			f _{LC} - Exhibit 23-5																							
			f _N - Exhibit 23-6																							
			f _{ID} - Exhibit 23-7																							

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>McCormick Off/On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6657</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3754</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S			S																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>McCormick On/N Texas Off</i>																								
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Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6746</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
Free-Flow Speed: FFS = 75 mi/h, 70 mi/h, 65 mi/h, 60 mi/h, 55 mi/h Density: 11 pc/mi/ln, 18 pc/mi/ln, 26 pc/mi/ln, 35 pc/mi/ln, 45 pc/mi/ln Flow Rate (pc/h/ln): 0, 400, 800, 1200, 1600, 2000, 2400 Average Passenger-Car Speed (mi/h): 30, 40, 50, 60, 70, 80			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Project Description No Build Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6321	veh/h	Peak-Hour Factor, PHF	0.90																					
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:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		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			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		2		f_N	4.5 mi/h																					
FFS (measured)			mi/h	FFS	63.0 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
S			S																							
$D = v_p / S$			$D = v_p / S$																							
LOS			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>N Texas On/IH35W Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6409</i> veh/h		Peak-Hour Factor, PHF <i>0.90</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>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3614</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>N Texas On/IH35W Off</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>3967</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2237</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>54.8</i> mi/h			S <i>mi/h</i>																							
$D = v_p / S$ <i>40.8</i> pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>E</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>IH35W On/Oak On</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7126</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4018</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		EJP	Highway/Direction of Travel		IH 35E Northbound																					
Agency or Company		CAI	From/To		Oak On/US 380 Off																					
Date Performed		2/25/2009	Jurisdiction																							
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description No Build Northbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		7506	veh/h	Peak-Hour Factor, PHF	0.90																					
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:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		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			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		2		f_N	4.5 mi/h																					
FFS (measured)			mi/h	FFS	63.0 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
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v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>IH 35E Northbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>US 380 Off/End of Project</i>																								
Date Performed <i>2/25/2009</i>		Jurisdiction																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Northbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5648</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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 <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3185</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S			S																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
DDHV - Directional design hour volume																										

FREEWAY LANES

NO-BUILD

SOUTHBOUND

LEVELS OF SERVICE HCS OUTPUT

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>End of Project/US 380 On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5817</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3296</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS <i>F</i>			Required Number of Lanes, N																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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Flow Inputs																										
Volume, V <i>5817</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
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Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
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Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7295</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4134</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It includes Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Flow Inputs																										
Volume, V <i>4260</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>2414</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
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LOS <i>F</i>			Required Number of Lanes, N																							
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D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>IH35W On/N Texas Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5437</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3081</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

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Application	Input	Output																								
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Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>N Texas Off/N Texas On</i>																								
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Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5358</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
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Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3036</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It includes Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Dashed lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>N Texas On/McCormick Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6853</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3883</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
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N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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Analyst		EJP	Highway/Direction of Travel		Southbound																					
Agency or Company		CAI	From/To		McCormick Off/On																					
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Project Description No Build Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6773	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	4																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
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Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
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S			S																							
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
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Flow Inputs																										
Volume, V <i>7490</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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DDHV = AADT x K x D veh/h		Grade % Length <i>mi</i>																								
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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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4244</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
S - Speed			f_{LW} - Exhibit 23-4																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
D - Density			f_{LC} - Exhibit 23-5																							
v_p - Flow rate			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
LOS - Level of service			f_p - Page 23-12																							
BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		EJP	Highway/Direction of Travel		Southbound																					
Agency or Company		CAI	From/To		Fort Worth Off/On																					
Date Performed		3/17/2009	Jurisdiction		TxDOT Dallas District																					
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description No Build Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		6720	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	4																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
Peak-Hr Direction Prop, D				General Terrain:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R	1.2																					
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.980																					
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		2		f_N	4.5 mi/h																					
FFS (measured)			mi/h	FFS	63.0 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		3808	pc/h/ln	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																						
S			mi/h	S																						
$D = v_p / S$			pc/mi/ln	$D = v_p / S$																						
LOS		F		Required Number of Lanes, N																						
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
DDHV - Directional design hour volume																										

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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows five Free-Flow Speed (FFS) curves: 75 mi/h, 70 mi/h, 65 mi/h, 60 mi/h, and 55 mi/h. Dashed lines represent density levels: 11 pc/mi/ln, 18 pc/mi/ln, 26 pc/mi/ln, 35 pc/mi/ln, 45 pc/mi/ln, and 55 pc/mi/ln. The graph is divided into five regions labeled A, B, C, D, and E, corresponding to different Levels of Service (LOS).			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Fort Worth On/Teasley Off</i>																								
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Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7526</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4265</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Fort Worth On/Teasley Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6332</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3588</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Teasley Off/Loop288 Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6598</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3739</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS <i>F</i>			Required Number of Lanes, N																							
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DDHV - Directional design hour volume																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Loop288 Off/US77 On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6288</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3563</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7172</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4064</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
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Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>6278</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D		General Terrain: <i>Level</i>																								
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Operational (LOS)			Design (N)																							
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S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>5614</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3949</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves representing Free-Flow Speed (FFS) for different levels of service (LOS A through F). Solid lines represent density thresholds (11, 18, 26, 35, 45 pc/mi/ln). Data points are plotted at flow rates of 1300, 1450, 1600, and 1750 pc/h/ln, corresponding to speeds of approximately 70, 65, 60, and 55 mi/h respectively.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Mayhill On/Post Oak Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7986</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4525</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows five Free-Flow Speed (FFS) curves: 75 mi/h, 70 mi/h, 65 mi/h, 60 mi/h, and 55 mi/h. Dashed lines represent density levels: 11 pc/mi/ln, 18 pc/mi/ln, 26 pc/mi/ln, 35 pc/mi/ln, 45 pc/mi/ln, and 55 pc/mi/ln. Regions A through F are marked on the graph.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Post Oak Off/On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>7641</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4330</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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Glossary			Factor Location																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Post Oak On/Corinth Off</i>																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8951</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5072</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8411</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corinth On/Dobbs Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8854</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured)		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5017</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S			S																							
D = v_p / S			D = v_p / S																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
V - Hourly volume			E_T - Exhibits 23-8, 23-10, 23-11																							
v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8650</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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DDHV = AADT x K x D veh/h		Grade % Length <i>mi</i>																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4902</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
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Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
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Flow Inputs																										
Volume, V <i>7297</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
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Flow Inputs																										
Volume, V <i>9111</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
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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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>2</i>		f_N <i>4.5</i> mi/h																								
FFS (measured) mi/h		FFS <i>63.0</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5163</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Country On/Copperas Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10810</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4084</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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DDHV - Directional design hour volume																										

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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels of 11, 18, 25, 35, and 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Project Description ☐ No Build ☒ Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9580</i>		veh/h		Peak-Hour Factor, PHF <i>0.90</i>																						
AADT		veh/day		%Trucks and Buses, P_T <i>4</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>																						
Driver type adjustment <i>1.00</i>				Up/Down %																						
Calculate Flow Adjustments																										
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i>		ft		f_{LW} <i>0.0</i> mi/h																						
Rt-Shoulder Lat. Clearance <i>6.0</i>		ft		f_{LC} <i>0.0</i> mi/h																						
Interchange Density <i>1.00</i>		l/mi		f_{ID} <i>2.5</i> mi/h																						
Number of Lanes, N <i>3</i>				f_N <i>3.0</i> mi/h																						
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Base free-flow Speed, BFFS <i>70.0</i>		mi/h																								
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3619</i>			Design LOS																							
S			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
D = v_p / S			S																							
LOS <i>F</i>			D = v_p / S																							
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Glossary			Factor Location																							
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LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Garden Ridge On/FM407 Off</i>																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10155</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3836</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
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Agency or Company <i>CAI</i>		From/To <i>FM407 Off/Valley Ridge Off</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>9093</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3435</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
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LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
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FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
BFFS - Base free-flow speed																										

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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valley Ridge Off/FM1171 Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8651</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT		%Trucks and Buses, P_T <i>4</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		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured)		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3268</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S <i>mi/h</i>			S <i>mi/h</i>																							
$D = v_p / S$ <i>pc/mi/ln</i>			$D = v_p / S$ <i>pc/mi/ln</i>																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10																						
V - Hourly volume		D - Density		f_{LW} - Exhibit 23-4																						
v_p - Flow rate		FFS - Free-flow speed		E_T - Exhibits 23-8, 23-10, 23-11																						
LOS - Level of service		BFFS - Base free-flow speed		f_{LC} - Exhibit 23-5																						
DDHV - Directional design hour volume				f_p - Page 23-12																						
				f_N - Exhibit 23-6																						
				LOS, S, FFS, v_p - Exhibits 23-2, 23-3																						
				f_{ID} - Exhibit 23-7																						

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Application	Input	Output																								
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>8023</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D		General Terrain: <i>Level</i>																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3031</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows Free-Flow Speed (FFS) curves for 75, 70, 65, 60, and 55 mi/h. Density lines are marked at 11, 18, 26, 35, 45, and 55 pc/mi/ln. Regions A through F represent different levels of service (LOS).			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Flow Inputs																										
Volume, V <i>10213</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3858</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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Flow Inputs																										
Volume, V <i>11178</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Flow Inputs																										
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AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
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Peak-Hr Direction Prop, D		General Terrain: <i>Level</i>																								
DDHV = AADT x K x D veh/h		Grade % Length <i>mi</i>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4055</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Fox On/BSH121 Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11726</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
Peak-Hr Direction Prop, D		General Terrain: <i>Level</i>																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4430</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS <i>F</i>			Required Number of Lanes, N																							
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N - Number of lanes			E_R - Exhibits 23-8, 23-10																							
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v_p - Flow rate			f_p - Page 23-12																							
LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
DDHV - Directional design hour volume			f_{LW} - Exhibit 23-4																							
S - Speed			f_{LC} - Exhibit 23-5																							
D - Density			f_N - Exhibit 23-6																							
FFS - Free-flow speed			f_{ID} - Exhibit 23-7																							
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BASIC FREEWAY SEGMENTS WORKSHEET																										
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>BSH121 Off/On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10549</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3985</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows five Free-Flow Speed (FFS) curves: 75 mi/h, 70 mi/h, 65 mi/h, 60 mi/h, and 55 mi/h. Dashed lines represent density levels: 11 pc/mi/ln, 18 pc/mi/ln, 26 pc/mi/ln, 35 pc/mi/ln, 45 pc/mi/ln, and 55 pc/mi/ln. The graph is divided into five regions labeled A, B, C, D, and E, corresponding to different Levels of Service (LOS).			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Project Description No Build Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		12018	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	4																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
Peak-Hr Direction Prop, D				General Terrain:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R	1.2																					
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.980																					
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Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		3		f_N	3.0 mi/h																					
FFS (measured)			mi/h	FFS	64.5 mi/h																					
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
S			S																							
$D = v_p / S$			$D = v_p / S$																							
LOS			Required Number of Lanes, N																							
Glossary			Factor Location																							
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Volume, V <i>11186</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
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S mi/h			S mi/h																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
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Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Corporate On/FM3040 Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12088</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4567</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
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v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11221</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4239</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10000</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Operational (LOS)			Design (N)																							
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☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10903</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
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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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4383</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
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Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>SH121 Toll On/Frankford Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>14683</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5547</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density levels from 11 to 45 pc/mi/ln. Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Flow Inputs																										
Volume, V <i>13841</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>WB PGBT Off/Frankford On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>10079</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>3808</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst		EJP	Highway/Direction of Travel		Southbound																					
Agency or Company		CAI	From/To		Frankford On/PGBT On																					
Date Performed		3/17/2009	Jurisdiction		TxDOT Dallas District																					
Analysis Time Period		DHV	Analysis Year		2030																					
Project Description No Build Southbound																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V		10990	veh/h	Peak-Hour Factor, PHF	0.90																					
AADT			veh/day	%Trucks and Buses, P_T	4																					
Peak-Hr Prop. of AADT, K				%RVs, P_R	0																					
Peak-Hr Direction Prop, D				General Terrain:	Level																					
DDHV = AADT x K x D			veh/h	Grade % Length	mi																					
Driver type adjustment		1.00		Up/Down %																						
Calculate Flow Adjustments																										
f_p		1.00		E_R	1.2																					
E_T		1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.980																					
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width		12.0	ft	f_{LW}	0.0 mi/h																					
Rt-Shoulder Lat. Clearance		6.0	ft	f_{LC}	0.0 mi/h																					
Interchange Density		1.00	l/mi	f_{ID}	2.5 mi/h																					
Number of Lanes, N		3		f_N	3.0 mi/h																					
FFS (measured)			mi/h	FFS	64.5 mi/h																					
Base free-flow Speed, BFFS		70.0	mi/h																							
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$																							
4152 pc/h/ln			pc/h																							
S mi/h			mi/h																							
$D = v_p / S$			$D = v_p / S$																							
LOS F			pc/mi/ln																							
			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed	E_R - Exhibits 23-8, 23-10		f_{LW} - Exhibit 23-4																					
V - Hourly volume		D - Density	E_T - Exhibits 23-8, 23-10, 23-11		f_{LC} - Exhibit 23-5																					
v_p - Flow rate		FFS - Free-flow speed	f_p - Page 23-12		f_N - Exhibit 23-6																					
LOS - Level of service		BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 23-2, 23-3		f_{ID} - Exhibit 23-7																					
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>PGBT On/Whitlock Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>13068</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
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FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4937</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Whitlock Off/On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12361</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
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Speed Inputs			Calc Speed Adj and FFS																							
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$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4670</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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Application	Input	Output																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>13794</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5211</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Belt Line Off/On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>11865</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
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LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4482</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Belt Line On/Crosby On</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
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Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>12635</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
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Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>4773</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes S - Speed			E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																							
V - Hourly volume D - Density			E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																							
v_p - Flow rate FFS - Free-flow speed			f_p - Page 23-12 f_N - Exhibit 23-6																							
LOS - Level of service BFFS - Base free-flow speed			LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																							
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Application	Input	Output																								
Operational (LOS)	FFS, N, v_p	LOS, S, D																								
Design (N)	FFS, LOS, v_p	N, S, D																								
Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
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General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Crosby On/Valwood Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>13325</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</i>		Up/Down %																								
Calculate Flow Adjustments																										
f_p <i>1.00</i>		E_R <i>1.2</i>																								
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Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
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Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5034</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
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LOS <i>F</i>			Required Number of Lanes, N																							
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LOS - Level of service			LOS, S, FFS, v_p - Exhibits 23-2, 23-3																							
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Flow Inputs																										
Volume, V <i>12546</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
Peak-Hr Prop. of AADT, K		%RVs, P_R <i>0</i>																								
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Design (v_p)	FFS, LOS, N	v_p , S, D																								
Planning (LOS)	FFS, N, AADT	LOS, S, D																								
Planning (N)	FFS, LOS, AADT	N, S, D																								
Planning (v_p)	FFS, LOS, N	v_p , S, D																								
General Information			Site Information																							
Analyst <i>EJP</i>		Highway/Direction of Travel <i>Southbound</i>																								
Agency or Company <i>CAI</i>		From/To <i>Valwood On/Valley View Off</i>																								
Date Performed <i>3/17/2009</i>		Jurisdiction <i>TxDOT Dallas District</i>																								
Analysis Time Period <i>DHV</i>		Analysis Year <i>2030</i>																								
Project Description <i>No Build Southbound</i>																										
☒ Oper.(LOS) ☐ Des.(N) ☐ Planning Data																										
Flow Inputs																										
Volume, V <i>13582</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</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>																								
Driver type adjustment <i>1.00</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>0.980</i>																								
Speed Inputs			Calc Speed Adj and FFS																							
Lane Width <i>12.0</i> ft		f_{LW} <i>0.0</i> mi/h																								
Rt-Shoulder Lat. Clearance <i>6.0</i> ft		f_{LC} <i>0.0</i> mi/h																								
Interchange Density <i>1.00</i> l/mi		f_{ID} <i>2.5</i> mi/h																								
Number of Lanes, N <i>3</i>		f_N <i>3.0</i> mi/h																								
FFS (measured) mi/h		FFS <i>64.5</i> mi/h																								
Base free-flow Speed, BFFS <i>70.0</i> mi/h																										
LOS and Performance Measures			Design (N)																							
Operational (LOS)			Design (N)																							
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ <i>5131</i> pc/h/ln			$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h																							
S mi/h			S mi/h																							
$D = v_p / S$ pc/mi/ln			$D = v_p / S$ pc/mi/ln																							
LOS <i>F</i>			Required Number of Lanes, N																							
Glossary			Factor Location																							
N - Number of lanes		S - Speed		E_R - Exhibits 23-8, 23-10 f_{LW} - Exhibit 23-4																						
V - Hourly volume		D - Density		E_T - Exhibits 23-8, 23-10, 23-11 f_{LC} - Exhibit 23-5																						
v_p - Flow rate		FFS - Free-flow speed		f_p - Page 23-12 f_N - Exhibit 23-6																						
LOS - Level of service		BFFS - Base free-flow speed		LOS, S, FFS, v_p - Exhibits 23-2, 23-3 f_{ID} - Exhibit 23-7																						
DDHV - Directional design hour volume																										

BASIC FREEWAY SEGMENTS WORKSHEET																										
The graph plots Average Passenger-Car Speed (mi/h) on the y-axis (30 to 80) against Flow Rate (pc/h/ln) on the x-axis (0 to 2400). It shows several dashed curves for Free-Flow Speed (FFS) at 75, 70, 65, 60, and 55 mi/h. Solid lines represent density (10, 20, 30, 35, 40, 45 pc/mi/ln). Points A through F are marked on the graph, corresponding to different flow and speed conditions.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Application</th> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>Operational (LOS)</td> <td>FFS, N, v_p</td> <td>LOS, S, D</td> </tr> <tr> <td>Design (N)</td> <td>FFS, LOS, v_p</td> <td>N, S, D</td> </tr> <tr> <td>Design (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> <tr> <td>Planning (LOS)</td> <td>FFS, N, AADT</td> <td>LOS, S, D</td> </tr> <tr> <td>Planning (N)</td> <td>FFS, LOS, AADT</td> <td>N, S, D</td> </tr> <tr> <td>Planning (v_p)</td> <td>FFS, LOS, N</td> <td>v_p, S, D</td> </tr> </tbody> </table>			Application	Input	Output	Operational (LOS)	FFS, N, v_p	LOS, S, D	Design (N)	FFS, LOS, v_p	N, S, D	Design (v_p)	FFS, LOS, N	v_p , S, D	Planning (LOS)	FFS, N, AADT	LOS, S, D	Planning (N)	FFS, LOS, AADT	N, S, D	Planning (v_p)	FFS, LOS, N	v_p , S, D
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Flow Inputs																										
Volume, V <i>12750</i> veh/h		Peak-Hour Factor, PHF <i>0.90</i>																								
AADT veh/day		%Trucks and Buses, P_T <i>4</i>																								
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