APPENDIX E

FREEWAY WEAVING CALCULATION SHEETS

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Existing

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Existing AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45
Weaving number of lanes, N	3
Weaving seg length, L (ft)	720
Terrain	Level

Weaving type	B
Volume ratio, VR	0.95
Weaving ratio, R	0.47

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	89	0.92	2	0	1.5	1.2	0.990	1.00	97
V_{w1}	760	0.92	2	0	1.5	1.2	0.990	1.00	834
V_{w2}	853	0.92	2	0	1.5	1.2	0.990	1.00	936
V_w				1770	V_{nw}				97
V									1867

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			2.19	1.27
Weaving and non-weaving speeds, Si (mi/h)			25.97	30.44

Number of lanes required for unconstrained operation, Nw 3.57
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	26.17
Weaving segment density, D (pc/mi/ln)	23.78
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Existing

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Existing PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45
Weaving number of lanes, N	3
Weaving seg length, L (ft)	720
Terrain	Level

Weaving type	B
Volume ratio, VR	0.96
Weaving ratio, R	0.39

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	98	0.92	2	0	1.5	1.2	0.990	1.00	107
V_{w1}	920	0.92	2	0	1.5	1.2	0.990	1.00	1009
V_{w2}	1413	0.92	2	0	1.5	1.2	0.990	1.00	1551
V_w				2560	V_{nw}				107
V									2667

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			2.85	1.88
Weaving and non-weaving speeds, Si (mi/h)			24.10	27.16

Number of lanes required for unconstrained operation, Nw 3.61
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	24.20
Weaving segment density, D (pc/mi/ln)	36.73
Level of service, LOS	E
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Existing

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Existing AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	1100
Terrain	Level

Weaving type	B
Volume ratio, VR	0.40
Weaving ratio, R	0.27

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3124	0.92	2	0	1.5	1.2	0.990	1.00	3429
V_{o2}	65	0.92	2	0	1.5	1.2	0.990	1.00	71
V_{w1}	1529	0.92	2	0	1.5	1.2	0.990	1.00	1678
V_{w2}	576	0.92	2	0	1.5	1.2	0.990	1.00	632
V_w				2310	V_{nw}				3500
V									5810

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.01	0.87		
Weaving and non-weaving speeds, Si (mi/h)	42.40	44.41		

Number of lanes required for unconstrained operation, Nw 1.63
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	43.59
Weaving segment density, D (pc/mi/ln)	44.43
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	5658
Capacity as a 15-minute flow rate, c (veh/h)	5602
Capacity as a full-hour volume, c_h (veh/h)	5154

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Existing

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Existing PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	1100
Terrain	Level

Weaving type	B
Volume ratio, VR	0.59
Weaving ratio, R	0.45

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	936	0.92	2	0	1.5	1.2	0.990	1.00	1027
V_{o2}	74	0.92	2	0	1.5	1.2	0.990	1.00	81
V_{w1}	798	0.92	2	0	1.5	1.2	0.990	1.00	876
V_{w2}	664	0.92	2	0	1.5	1.2	0.990	1.00	728
V_w				1604	V_{nw}				1108
V									2712

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.79	0.89		
Weaving and non-weaving speeds, Si (mi/h)	45.79	44.17		

Number of lanes required for unconstrained operation, Nw 2.23
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	45.11
Weaving segment density, D (pc/mi/ln)	20.04
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	4932
Capacity as a 15-minute flow rate, c (veh/h)	4883
Capacity as a full-hour volume, c_h (veh/h)	4492

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Existing

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Existing AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.32
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.32
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1407	0.92	2	0	1.5	1.2	0.990	1.00	1544
V_{o2}	20	0.92	2	0	1.5	1.2	0.990	1.00	21
V_{w1}	456	0.92	2	0	1.5	1.2	0.990	1.00	500
V_{w2}	217	0.92	2	0	1.5	1.2	0.990	1.00	238
V_w				738	V_{nw}				1565
V									2303

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, W_i	0.31	0.16		
Weaving and non-weaving speeds, Si (mi/h)	57.03	62.30		

Number of lanes required for unconstrained operation, Nw 0.93
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ If Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	60.51
Weaving segment density, D (pc/mi/ln)	12.69
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	6602
Capacity as a 15-minute flow rate, c (veh/h)	6537
Capacity as a full-hour volume, c_h (veh/h)	6014

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Existing

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Existing PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	2500
Terrain	Level
Weaving type	B
Volume ratio, VR	0.34
Weaving ratio, R	0.28

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2973	0.92	2	0	1.5	1.2	0.990	1.00	3263
V_{o2}	50	0.92	2	0	1.5	1.2	0.990	1.00	54
V_{w1}	1120	0.92	2	0	1.5	1.2	0.990	1.00	1229
V_{w2}	427	0.92	2	0	1.5	1.2	0.990	1.00	468
V_w				1697	V_{nw}				3317
V									5014

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving Intensity factor, Wi	0.55	0.38		
Weaving and non-weaving speeds, Si (mi/h)	50.53	54.73		

Number of lanes required for unconstrained operation, Nw 1.02
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	53.23
Weaving segment density, D (pc/mi/ln)	31.40
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	6515
Capacity as a 15-minute flow rate, c (veh/h)	6450
Capacity as a full-hour volume, c_h (veh/h)	5934

Notes

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

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Design Year	Existing AM
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	3
total segment length (ft)	720
Total ECR on ramp volume	942
Total Carmel Creek Off ramp volume	849
SR 56 EB Volume going through	1010
Total Mainline volume after diverge	1952

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1009	1159	1399	843
Aux lane	942	834		849

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1159 in lane 2 is less than 1650 for PHF of 0.91=> Better thanLOS D
2. The weaving value of 1399 is less than 1650 for 0.91 PHF=> Better than LOS D
3. The total freeway volume of 1967 is less than 3300 for PHF of 0.91 => Better than LOS D

Weaving length = 720'. Used 1000' for analysis purposes.

Design Year	Existing PM
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2
total segment length (ft)	720
Total ECR on ramp volume	1511
Total Carmel Creek Off ramp volume	1018
SR 56 EB Volume going through	2680
Total Mainline volume after diverge	4191

RESULTS

1. The merge value of 2391 in lane 2 is over 1650 for PHF of 0.91=> **LOS F**
2. The weaving value of 1982 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 4133 is more than 3300 for PHF of 0.91 => **Worse than LOS D**

Weaving length = 720'. Used 1000' for analysis purposes.

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1905	2391	1982	1965
Aux lane	1511	1076		1018

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

Design Year	Existing AM
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	641
Total off ramp volume to El Camino Real	1594
SR 56 WB Volume going through	3059
Total Mainline volume after diverge	3700

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1698	1079	1724	619
Aux lane	641	1340		1594

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1079 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 1724 is more than 1650 for any PHF=> **Worse than LOS D**
3. The total freeway volume of 3954 is more than 3300 for 4-lane freeway at any PHF=>**Worse than LOS D**

Design Year	Existing PM
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4
total segment length (ft)	1000
Total Carmel Creek on ramp volume	738
Total Off ramp volume to El Camino Real	872
SR 56 WB Volume going through	862
Total Mainline volume after diverge	1600

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	880	851	1253	554
Aux lane	738	810		872

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 851 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1253 is less than 1650 for PHF of 0.91=> **Worse THAN LOS D**
3. The total freeway volume of 1662 is less than 3300 for 4-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

Design Year	Existing AM
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500'
Total Carmel Creek on ramp volume	237
SR 56 EB volume weaving from Mainline to Carmel Country Road	476
SR 56 EB Volume going through before Carmel Creek on-ramp	1387
Total Mainline volume after diverge	1624

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	302	297	321	290	200	138	266
Aux lane	237	323	340	383	445	476	

NOTES

1. The merge value of 297 in lane 2 is below 1650 for PHF of 0.91=> BETTER than LOS D
2. The weaving value of 266 is less than1650 for 0.91 PHF=> BETTER than LOS D
3. The total freeway volume of 1777 is less than 3300 for 4-lane freeway at any PHF=> BetterThan LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Existing PM
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500'
Total Carmel Creek on ramp volume	477
SR 56 EB volume weaving from Mainline to Carmel Country Road	1170
SR 56 EB Volume going through before Carmel Creek on-ramp	2923
Total Mainline volume after diverge	3400

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	714	661	693	631	426	285	614
Aux lane	477	729	812	932	1091	1170	

NOTES

1. The merge value of 661 in lane 2 is below 1650 for PHF of 0.91=> BETTER than LOS D
2. The weaving value of 614 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 3841 is more than 3300 for 4-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Year 2015 AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2015 No Build (Run A)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.97
Weaving seg length, L (ft)	720	Weaving ratio, R	0.45
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	60	0.92	2	0	1.5	1.2	0.990	1.00	65
V_{w1}	940	0.92	2	0	1.5	1.2	0.990	1.00	1031
V_{w2}	1143	0.92	2	0	1.5	1.2	0.990	1.00	1254
V_w				2285	V_{nw}				65
V									2350

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			2.64	1.72
Weaving and non-weaving speeds, Si (mi/h)			24.61	27.87

Number of lanes required for unconstrained operation, Nw 3.64
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ If Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	24.69
Weaving segment density, D (pc/mi/ln)	31.73
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Year 2015 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2015 No Build (Run A)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.97
Weaving seg length, L (ft)	720	Weaving ratio, R	0.31
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	100	0.92	2	0	1.5	1.2	0.990	1.00	109
V_{w1}	1100	0.92	2	0	1.5	1.2	0.990	1.00	1207
V_{w2}	2457	0.92	2	0	1.5	1.2	0.990	1.00	2697
V_w				3904	V_{nw}				109
V									4013

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			3.85	2.94
Weaving and non-weaving speeds, Si (mi/h)			22.22	23.89

Number of lanes required for unconstrained operation, Nw 3.63
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	22.26
Weaving segment density, D (pc/mi/ln)	60.08
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2015 No Build (Run A)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.46
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.22
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3220	0.92	2	0	1.5	1.2	0.990	1.00	3534
V_{o2}	120	0.92	2	0	1.5	1.2	0.990	1.00	131
V_{w1}	2172	0.92	2	0	1.5	1.2	0.990	1.00	2384
V_{w2}	630	0.92	2	0	1.5	1.2	0.990	1.00	691
V_w				3075	V_{nw}				3665
V									6740

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.22	1.29		
Weaving and non-weaving speeds, Si (mi/h)	39.74	39.00		

Number of lanes required for unconstrained operation, Nw 1.90
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	39.33
Weaving segment density, D (pc/mi/ln)	57.12
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	5411
Capacity as a 15-minute flow rate, c (veh/h)	5357
Capacity as a full-hour volume, c_h (veh/h)	4928

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2015 No Build (Run A)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	1100
Terrain	Level
Weaving type	B
Volume ratio, VR	0.55
Weaving ratio, R	0.45

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1095	0.92	2	0	1.5	1.2	0.990	1.00	1202
V_{o2}	185	0.92	2	0	1.5	1.2	0.990	1.00	203
V_{w1}	850	0.92	2	0	1.5	1.2	0.990	1.00	933
V_{w2}	705	0.92	2	0	1.5	1.2	0.990	1.00	773
V_w				1706	V_{nw}				1405
V									3111

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.82	0.86		
Weaving and non-weaving speeds, Si (mi/h)	45.30	44.54		

Number of lanes required for unconstrained operation, Nw 2.09
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	44.96
Weaving segment density, D (pc/mi/ln)	23.07
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	5071
Capacity as a 15-minute flow rate, c (veh/h)	5021
Capacity as a full-hour volume, c_h (veh/h)	4619

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 No Build AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 No Build (Run A)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	2500
Terrain	Level

Weaving type	B
Volume ratio, VR	0.31
Weaving ratio, R	0.34

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1683	0.92	2	0	1.5	1.2	0.990	1.00	1847
V_{o2}	30	0.92	2	0	1.5	1.2	0.990	1.00	32
V_{w1}	520	0.92	2	0	1.5	1.2	0.990	1.00	570
V_{w2}	263	0.92	2	0	1.5	1.2	0.990	1.00	288
V_w				858	V_{nw}				1879
V									2737

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.34	0.19		
Weaving and non-weaving speeds, Si (mi/h)	55.92	61.32		

Number of lanes required for unconstrained operation, Nw 0.91
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	59.52
Weaving segment density, D (pc/mi/ln)	15.33
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	6635
Capacity as a 15-minute flow rate, c (veh/h)	6569
Capacity as a full-hour volume, c_h (veh/h)	6043

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 No Build PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 No Build (Run A)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.32
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.28
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3777	0.92	2	0	1.5	1.2	0.990	1.00	4146
V_{o2}	60	0.92	2	0	1.5	1.2	0.990	1.00	65
V_{w1}	1320	0.92	2	0	1.5	1.2	0.990	1.00	1449
V_{w2}	520	0.92	2	0	1.5	1.2	0.990	1.00	570
V_w				2019	V_{nw}				4211
V									6230

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.62	0.45		
Weaving and non-weaving speeds, Si (mi/h)	48.89	52.99		

Number of lanes required for unconstrained operation, Nw 1.00
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	51.59
Weaving segment density, D (pc/mi/ln)	40.25
Level of service, LOS	E
Capacity of base condition, c_b (pc/h)	6584
Capacity as a 15-minute flow rate, c (veh/h)	6519
Capacity as a full-hour volume, c_h (veh/h)	5997

Notes

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

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Design Year	Year 2015 No Build (Run A)
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	3
total segment length (ft)	720
Total ECR on ramp volume	1203
Total Carmel Creek Off ramp volume	1000
SR 56 EB Volume going through	1060
Total Mainline volume after diverge	2263

RESULTS

1. The merge value of 1414 in lane 2 is less than 1650 for PHF of 0.91=> Better than LOS D
2. The weaving value of 1722 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 2262 is less than 3300 for PHF of 0.91 => Better than LOS D

Weaving length = 720'. Used 1000' for analysis purposes.

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1162	1414	1722	1030
Aux lane	1203	1001		1000

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

Design Year	Year 2015 No Build (Run A)
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2
total segment length (ft)	720
Total ECR on ramp volume	2557
Total Carmel Creek Off ramp volume	1200
SR 56 EB Volume going through	2640
Total Mainline volume after diverge	5197

RESULTS

1. The merge value of 3258 in lane 2 is over 1650 for PHF of 0.91=> **LOS F**
2. The weaving value of 2958 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 4974 is more than 3300 for PHF of 0.91 => **Worse than LOS D**

Weaving length = 720'. Used 1000' for analysis purposes.

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2064	3258	2958	2663
Aux lane	2557	1423		1200

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

Design Year	Year 2015 No Build (Run A)
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	750
Total off ramp volume to El Camino Real	2292
SR 56 WB Volume going through	3100
Total Mainline volume after diverge	3850

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2363	1336	2342	696
Aux lane	750	1892		2292

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1336 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 2342 is more than 1650 for any PHF=> **Worse than LOS D**
3. The total freeway volume of 4250 is more than 3300 for 4-lane freeway at any PHF=>**Worse than LOS D**

Design Year	Year 2015 No Build (Run A)
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4
total segment length (ft)	1000
Total Carmel Creek on ramp volume	890
Total Off ramp volume to El Camino Real	1035
SR 56 WB Volume going through	910
Total Mainline volume after diverge	1800

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1038	1015	1499	660
Aux lane	890	965		1035

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1015 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1499 is less than 1650 for PHF of 0.91=> **Worse THAN LOS D**
3. The total freeway volume of 1870 is less than 3300 for 4-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

Design Year	Year 2015 No Build (Run A)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500'
Total Carmel Creek on ramp volume	293
SR 56 EB volume weaving from Mainline to Carmel Country Road	550
SR 56 EB Volume going through before Carmel Creek on-ramp	1653
Total Mainline volume after diverge	1946

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	352	354	385	347	240	167	315
Aux lane	293	385	397	444	515	550	

NOTES

1. The merge value of 354 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 315 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 2111 is less than 3300 for 4-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 No Build (Run A)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500'
Total Carmel Creek on ramp volume	580
SR 56 EB volume weaving from Mainline to Carmel Country Road	1380
SR 56 EB Volume going through before Carmel Creek on-ramp	3717
Total Mainline volume after diverge	4297

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	858	802	845	769	525	356	731
Aux lane	580	870	961	1101	1287	1380	

NOTES

1. The merge value of 802 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 731 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 4807 is more than 3300 for 4-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM (No slip)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Aux Lane (Run B2)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.37
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	1693	0.92	2	0	1.5	1.2	0.990	1.00	1858
V_{o2}	40	0.92	2	0	1.5	1.2	0.990	1.00	43
V_{w1}	745	0.92	2	0	1.5	1.2	0.990	1.00	817
V_{w2}	253	0.92	2	0	1.5	1.2	0.990	1.00	277
V_w				1094	V_{nw}				1901
V									2995

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.40	0.26		
Weaving and non-weaving speeds, Si (mi/h)	54.31	58.70		

Number of lanes required for unconstrained operation, Nw 1.07
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	57.02
Weaving segment density, D (pc/mi/ln)	17.51
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	6387
Capacity as a 15-minute flow rate, c (veh/h)	6324
Capacity as a full-hour volume, c_h (veh/h)	5818

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM (No slip)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Aux Lane (Run B2)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	2500
Terrain	Level
Weaving type	B
Volume ratio, VR	0.36
Weaving ratio, R	0.28

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3787	0.92	2	0	1.5	1.2	0.990	1.00	4157
V_{o2}	70	0.92	2	0	1.5	1.2	0.990	1.00	76
V_{w1}	1585	0.92	2	0	1.5	1.2	0.990	1.00	1740
V_{w2}	610	0.92	2	0	1.5	1.2	0.990	1.00	669
V_w				2409	V_{nw}				4233
V									6642

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving Intensity factor, Wi	0.69	0.57		
Weaving and non-weaving speeds, Si (mi/h)	47.47	50.10		

Number of lanes required for unconstrained operation, Nw 1.16
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	49.11
Weaving segment density, D (pc/mi/ln)	45.08
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6399
Capacity as a 15-minute flow rate, c (veh/h)	6336
Capacity as a full-hour volume, c_h (veh/h)	5829

Notes

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

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Design Year	Year 2015 Aux Lane (Run B) (No slip)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	293
SR 56 EB volume weaving from Mainline to Carmel Country Road	785
SR 56 EB Volume going through before Carmel Creek on-ramp	1653
Total Mainline volume after diverge	1946

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1022	977	992	954	821	729	402
Aux lane	293	472	538	623	731	785	

NOTES

1. The merge value of 977 in lane 2 is less than 1650 for PHF of 0.91 => Better than LOS D
2. The weaving value of 402 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 2259 is less than 3300 for 4-lane freeway at any PHF=>**Better than LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Aux Lane (Run B) (No slip)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	580
SR 56 EB volume weaving from Mainline to Carmel Country Road	1655
SR 56 EB Volume going through before Carmel Creek on-ramp	3717
Total Mainline volume after diverge	4297

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	2248	2138	2161	2085	1811	1620	833
Aux lane	580	972	1126	1310	1540	1655	

NOTES

1. The merge value of 2138 in lane 2 is more than 1650 for PHF of 0.91=> Worse than LOS D
2. The weaving value of 833 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 4980 is more than 3300 for 4-lane freeway at any PHF=>Worse **than LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	2/9/2009
Analysis Time Period	Year 2015 AM Run C

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2015 Dir Conn (Run C) AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.96
Weaving seg length, L (ft)	720	Weaving ratio, R	0.41
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	60	0.92	2	0	1.5	1.2	0.990	1.00	65
V_{w1}	940	0.92	2	0	1.5	1.2	0.990	1.00	1031
V_{w2}	640	0.92	2	0	1.5	1.2	0.990	1.00	702
V_w				1733	V_{nw}				65
V									1798

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			2.17	1.28
Weaving and non-weaving speeds, Si (mi/h)			26.04	30.34

Number of lanes required for unconstrained operation, Nw 3.61
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	26.17
Weaving segment density, D (pc/mi/ln)	22.90
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	2/9/2009
Analysis Time Period	Year 2015 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2015 PM (Run C)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.97
Weaving seg length, L (ft)	720	Weaving ratio, R	0.39
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	100	0.92	2	0	1.5	1.2	0.990	1.00	109
V_{w1}	1100	0.92	2	0	1.5	1.2	0.990	1.00	1207
V_{w2}	1700	0.92	2	0	1.5	1.2	0.990	1.00	1866
V_w				3073	V_{nw}				109
V									3182

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			3.24	2.28
Weaving and non-weaving speeds, Si (mi/h)			23.25	25.67

Number of lanes required for unconstrained operation, Nw 3.62
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	23.32
Weaving segment density, D (pc/mi/ln)	45.48
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2015 Dir Conn (Run C) AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	4
Weaving seg length, L (ft)	1100
Terrain	Level
Weaving type	B
Volume ratio, VR	0.30
Weaving ratio, R	0.34

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4675	0.92	2	0	1.5	1.2	0.990	1.00	5132
V_{o2}	75	0.92	2	0	1.5	1.2	0.990	1.00	82
V_{w1}	1325	0.92	2	0	1.5	1.2	0.990	1.00	1454
V_{w2}	675	0.92	2	0	1.5	1.2	0.990	1.00	741
V_w				2195	V_{nw}				5214
V									7409

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.83	0.53		
Weaving and non-weaving speeds, Si (mi/h)	45.10	50.95		

Number of lanes required for unconstrained operation, Nw 1.61
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	49.06
Weaving segment density, D (pc/mi/ln)	37.75
Level of service, LOS	E
Capacity of base condition, c_b (pc/h)	8221
Capacity as a 15-minute flow rate, c (veh/h)	8140
Capacity as a full-hour volume, c_h (veh/h)	7489

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2015 Dir Conn (Run C) PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	4	Volume ratio, VR	0.37
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.33
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1949	0.92	2	0	1.5	1.2	0.990	1.00	2139
V_{o2}	89	0.92	2	0	1.5	1.2	0.990	1.00	97
V_{w1}	391	0.92	2	0	1.5	1.2	0.990	1.00	429
V_{w2}	801	0.92	2	0	1.5	1.2	0.990	1.00	879
V_w				1308	V_{nw}				2236
V									3544

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.56	0.35		
Weaving and non-weaving speeds, Si (mi/h)	50.33	55.69		

Number of lanes required for unconstrained operation, Nw 1.85
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	53.58
Weaving segment density, D (pc/mi/ln)	16.54
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	7732
Capacity as a 15-minute flow rate, c (veh/h)	7655
Capacity as a full-hour volume, c_h (veh/h)	7043

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Build (Run C)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.23
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.32
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2550	0.92	2	0	1.5	1.2	0.990	1.00	2799
V_{o2}	30	0.92	2	0	1.5	1.2	0.990	1.00	32
V_{w1}	520	0.92	2	0	1.5	1.2	0.990	1.00	570
V_{w2}	250	0.92	2	0	1.5	1.2	0.990	1.00	274
V_w				844	V_{nw}				2831
V									3675

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.26	0.10		
Weaving and non-weaving speeds, Si (mi/h)	58.79	64.93		

Number of lanes required for unconstrained operation, Nw 1.15
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	63.41
Weaving segment density, D (pc/mi/ln)	11.59
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	11578
Capacity as a 15-minute flow rate, c (veh/h)	11463
Capacity as a full-hour volume, c_h (veh/h)	10546

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Build (Run C)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	5
Weaving seg length, L (ft)	2500
Terrain	Level

Weaving type	B
Volume ratio, VR	0.30
Weaving ratio, R	0.28

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4276	0.92	2	0	1.5	1.2	0.990	1.00	4694
V_{o2}	56	0.92	2	0	1.5	1.2	0.990	1.00	61
V_{w1}	1324	0.92	2	0	1.5	1.2	0.990	1.00	1453
V_{w2}	504	0.92	2	0	1.5	1.2	0.990	1.00	553
V_w				2006	V_{nw}				4755
V									6761

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.44	0.26		
Weaving and non-weaving speeds, Si (mi/h)	53.18	58.75		

Number of lanes required for unconstrained operation, Nw 1.44
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ If Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	56.98
Weaving segment density, D (pc/mi/ln)	23.73
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	11189
Capacity as a 15-minute flow rate, c (veh/h)	11078
Capacity as a full-hour volume, c_h (veh/h)	10192

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Build (Run C2)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.32
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.24
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2040	0.92	2	0	1.5	1.2	0.990	1.00	2239
V_{o2}	40	0.92	2	0	1.5	1.2	0.990	1.00	43
V_{w1}	745	0.92	2	0	1.5	1.2	0.990	1.00	817
V_{w2}	240	0.92	2	0	1.5	1.2	0.990	1.00	263
V_w				1080	V_{nw}				2282
V									3362

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.28	0.14		
Weaving and non-weaving speeds, Si (mi/h)	57.92	63.12		

Number of lanes required for unconstrained operation, Nw 1.56
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	61.35
Weaving segment density, D (pc/mi/ln)	10.96
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	10922
Capacity as a 15-minute flow rate, c (veh/h)	10814
Capacity as a full-hour volume, c_h (veh/h)	9949

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM (No slip)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Build (Run C2)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	5
Weaving seg length, L (ft)	2500
Terrain	Level

Weaving type	B
Volume ratio, VR	0.32
Weaving ratio, R	0.24

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4288	0.92	2	0	1.5	1.2	0.990	1.00	4707
V_{o2}	68	0.92	2	0	1.5	1.2	0.990	1.00	74
V_{w1}	1587	0.92	2	0	1.5	1.2	0.990	1.00	1742
V_{w2}	492	0.92	2	0	1.5	1.2	0.990	1.00	540
V_w				2282	V_{nw}				4781
V									7063

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.47	0.30		
Weaving and non-weaving speeds, Si (mi/h)	52.29	57.21		

Number of lanes required for unconstrained operation, Nw 1.59
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	55.52
Weaving segment density, D (pc/mi/ln)	25.44
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	10900
Capacity as a 15-minute flow rate, c (veh/h)	10792
Capacity as a full-hour volume, c_h (veh/h)	9929

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM (WB C-D)

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2015 Dir Conn (Run C5) AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.56
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.21
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1130	0.92	2	0	1.5	1.2	0.990	1.00	1240
V_{o2}	280	0.92	2	0	1.5	1.2	0.990	1.00	307
V_{w1}	1400	0.92	2	0	1.5	1.2	0.990	1.00	1536
V_{w2}	370	0.92	2	0	1.5	1.2	0.990	1.00	406
V_w				1942	V_{nw}				1547
V									3489

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.89	1.00		
Weaving and non-weaving speeds, Si (mi/h)	44.05	42.53		

Number of lanes required for unconstrained operation, Nw 2.15
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	43.36
Weaving segment density, D (pc/mi/ln)	26.82
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	5045
Capacity as a 15-minute flow rate, c (veh/h)	4995
Capacity as a full-hour volume, c_h (veh/h)	4595

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2015 Dir Conn (Run C) PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	4	Volume ratio, VR	0.57
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.49
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	445	0.92	2	0	1.5	1.2	0.990	1.00	488
V_{o2}	285	0.92	2	0	1.5	1.2	0.990	1.00	312
V_{w1}	480	0.92	2	0	1.5	1.2	0.990	1.00	526
V_{w2}	505	0.92	2	0	1.5	1.2	0.990	1.00	554
V_w				1080	V_{nw}				800
V									1880

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.49	0.43		
Weaving and non-weaving speeds, Si (mi/h)	52.01	53.41		

Number of lanes required for unconstrained operation, Nw 2.71
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	52.60
Weaving segment density, D (pc/mi/ln)	8.94
Level of service, LOS	A
Capacity of base condition, c_b (pc/h)	6629
Capacity as a 15-minute flow rate, c (veh/h)	6563
Capacity as a full-hour volume, c_h (veh/h)	6038

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM (WB C-D)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Build (Run C5)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	5
Weaving seg length, L (ft)	2500
Terrain	Level

Weaving type	B
Volume ratio, VR	0.33
Weaving ratio, R	0.25

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2020	0.92	2	0	1.5	1.2	0.990	1.00	2217
V_{o2}	40	0.92	2	0	1.5	1.2	0.990	1.00	43
V_{w1}	765	0.92	2	0	1.5	1.2	0.990	1.00	839
V_{w2}	260	0.92	2	0	1.5	1.2	0.990	1.00	285
V_w				1124	V_{nw}				2260
V									3384

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.29	0.15		
Weaving and non-weaving speeds, Si (mi/h)	57.70	62.77		

Number of lanes required for unconstrained operation, Nw 1.61
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	60.99
Weaving segment density, D (pc/mi/ln)	11.10
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	10794
Capacity as a 15-minute flow rate, c (veh/h)	10687
Capacity as a full-hour volume, c_h (veh/h)	9832

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM (WB C-D)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Build (Run C5)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.33
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.24
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4268	0.92	2	0	1.5	1.2	0.990	1.00	4685
V_{o2}	68	0.92	2	0	1.5	1.2	0.990	1.00	74
V_{w1}	1607	0.92	2	0	1.5	1.2	0.990	1.00	1764
V_{w2}	512	0.92	2	0	1.5	1.2	0.990	1.00	562
V_w				2326	V_{nw}				4759
V									7085

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.48	0.31		
Weaving and non-weaving speeds, Si (mi/h)	52.16	56.94		

Number of lanes required for unconstrained operation, Nw 1.62
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	55.28
Weaving segment density, D (pc/mi/ln)	25.63
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	10839
Capacity as a 15-minute flow rate, c (veh/h)	10732
Capacity as a full-hour volume, c_h (veh/h)	9873

Notes

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

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Design Year	Year 2015 Direct Connector (Run C)
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	3
total segment length (ft)	720
Total ECR on ramp volume	700
Total Carmel Creek Off ramp volume	1000
SR 56 EB Volume going through	1910
Total Mainline volume after diverge	2610

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1523	1373	1320	1049
Aux lane	700	900		1000

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1373 in lane 2 is less than 1650 for PHF of 0.91=> Better than LOS D
2. The weaving value of 1320 is less than 1650 for 0.91 PHF=> Better than LOS D
3. The total freeway volume of 2710 is less than 3300 for PHF of 0.91 => Better than LOS D

Weaving length = 720'. Used 1000' for analysis purposes.

Design Year	Year 2015 Direct Connector (Run C)
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	3
total segment length (ft)	720
Total ECR on ramp volume	1800
Total Carmel Creek Off ramp volume	1200
SR 56 EB Volume going through	3900
Total Mainline volume after diverge	5700

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2700	3288	2352	2784
Aux lane	1800	1272		1200

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 3288 in lane 2 is over 1650 for PHF of 0.91=> **LOS F**
2. The weaving value of 2352 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 5628 is more than 3300 for PHF of 0.91 => **Worse than LOS D**

Weaving length = 720'. Used 1000' for analysis purposes.

Design Year	Year 2015 Direct Connector (Run C)
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	4 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	750
Total off ramp volume to El Camino Real	1400
SR 56 WB Volume going through	4600
Total Mainline volume after diverge	5350

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1744	1350	1664	924
Aux lane	750	1214		1400

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1350 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 1664 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 5536 is less than 6600 for 8-lane freeway at any PHF=> **LOS F**

Design Year	Year 2015 Direct Connector (Run C)
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	890
Total Off ramp volume to El Camino Real	480
SR 56 WB Volume going through	1860
Total Mainline volume after diverge	2750

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	605	976	1077	754
Aux lane	890	543		480

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 976 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1077 is less than 1650 for PHF of 0.91=> **BETTER THAN LOS D**
3. The total freeway volume of 2687 is less than 6600 for 8-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

Design Year	Year 2015 Run C with WB C-D
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	650
Total off ramp volume to El Camino Real	1680
SR 56 WB Volume going through	850
Total Mainline volume after diverge	1500

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1647	974	1797	493
Aux lane	650	1407		1680

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 974 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 1797 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 1773 is less than 4900 for 6-lane freeway at any PHF=> **LOS F**

Design Year	Year 2015 Run C with WB C-D
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	790
Total Off ramp volume to El Camino Real	765
SR 56 WB Volume going through	160
Total Mainline volume after diverge	950

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	736	825	1213	547
Aux lane	790	739		765

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 825 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1213 is less than 1650 for PHF of 0.91=> **BETTER THAN LOS D**
3. The total freeway volume of 976 is less than 4900 for 8-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

Design Year	Year 2015 Direct Connector (Run C)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	280
SR 56 EB volume weaving from Mainline to Carmel Country Road	550
SR 56 EB Volume going through before Carmel Creek on-ramp	1950
Total Mainline volume after diverge	2230

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2000'	Weaving at 500'
Lane 1							
Lane 2	370	366	395	359	253	181	310
Aux lane	280	377	394	443	514	550	

NOTES

1. The merge value of 366 in lane 2 is below 1650 for PHF of 0.91 => **BETTER LOS D**
2. The weaving value of 310 is less than 1650 for 0.91 PHF => BETTER THAN **LOS D**
3. The total freeway volume of 2403 is less than 4900 for 6-lane freeway at any PHF => BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)						
Distance	**0'**	**500'**	**1000'**	**1500'**	**2000'**	**2500'**
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)						
Distance	**0'**	**500'**	**1000'**	**1500'**	**2000'**	**2500'**
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Direct Connector (Run C)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2000
Total Carmel Creek on ramp volume	560
SR 56 EB volume weaving from Mainline to Carmel Country Road	1380
SR 56 EB Volume going through before Carmel Creek on-ramp	4220
Total Mainline volume after diverge	4780

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2000'	Weaving at 500'
Lane 1							
Lane 2	1226	1162	1200	1127	886	720	723
Aux lane	560	858	957	1099	1286	1380	

NOTES

1. The merge value of 1162 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 723 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 5302 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Run C(No Slip ramp)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	280
SR 56 EB volume weaving from Mainline to Carmel Country Road	785
SR 56 EB Volume going through before Carmel Creek on-ramp	2000
Total Mainline volume after diverge	2280

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	521	471	483	446	315	224	397
Aux lane	280	464	535	622	731	785	

NOTES

1. The merge value of 471 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 397 is less than 1650 for any PHF=> BETTER THAN LOS D
3. The total freeway volume of 2601 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Run C (No Slip ramp)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	560
SR 56 EB volume weaving from Mainline to Carmel Country Road	1655
SR 56 EB Volume going through before Carmel Creek on-ramp	4220
Total Mainline volume after diverge	4780

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1141	1023	1041	969	697	509	825
Aux lane	560	960	1122	1308	1539	1655	

NOTES

1. The merge value of 1023 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 825 is less than 1650 for any PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 5475 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Run C (With WB C-D)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	300
SR 56 EB volume weaving from Mainline to Carmel Country Road	805
SR 56 EB Volume going through before Carmel Creek on-ramp	1980
Total Mainline volume after diverge	2280

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	529	482	497	458	322	227	412
Aux lane	300	484	552	639	750	805	

NOTES

1. The merge value of 482 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 412 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 2601 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Run C (With WB C-D)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	580
SR 56 EB volume weaving from Mainline to Carmel Country Road	1675
SR 56 EB Volume going through before Carmel Creek on-ramp	4200
Total Mainline volume after diverge	4780

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1149	1034	1056	980	703	511	840
Aux lane	580	979	1138	1325	1558	1675	

NOTES

1. The merge value of 1034 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 840 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 5476 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Hybrid (Run D)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.38
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.26
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1676	0.92	2	0	1.5	1.2	0.990	1.00	1839
V_{o2}	43	0.92	2	0	1.5	1.2	0.990	1.00	47
V_{w1}	762	0.92	2	0	1.5	1.2	0.990	1.00	836
V_{w2}	270	0.92	2	0	1.5	1.2	0.990	1.00	296
V_w				1132	V_{nw}				1886
V									3018

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.41	0.27		
Weaving and non-weaving speeds, Si (mi/h)	54.07	58.24		

Number of lanes required for unconstrained operation, Nw 1.10
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	56.60
Weaving segment density, D (pc/mi/ln)	17.77
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	6340
Capacity as a 15-minute flow rate, c (veh/h)	6277
Capacity as a full-hour volume, c_h (veh/h)	5775

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Hybrid (Run D)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.36
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3769	0.92	2	0	1.5	1.2	0.990	1.00	4137
V_{o2}	72	0.92	2	0	1.5	1.2	0.990	1.00	79
V_{w1}	1603	0.92	2	0	1.5	1.2	0.990	1.00	1759
V_{w2}	528	0.92	2	0	1.5	1.2	0.990	1.00	579
V_w				2338	V_{nw}				4216
V									6554

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.68	0.55		
Weaving and non-weaving speeds, Si (mi/h)	47.72	50.60		

Number of lanes required for unconstrained operation, Nw 1.13
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ If Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	49.53
Weaving segment density, D (pc/mi/ln)	44.11
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6428
Capacity as a 15-minute flow rate, c (veh/h)	6364
Capacity as a full-hour volume, c_h (veh/h)	5855

Notes

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

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Design Year	Year 2015 Hybrid (Run D)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	313
SR 56 EB volume weaving from Mainline to Carmel Country Road	805
SR 56 EB Volume going through before Carmel Creek on-ramp	1633
Total Mainline volume after diverge	1946

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1024	981	1000	960	821	725	417
Aux lane	313	492	555	640	750	805	

NOTES

1. The merge value of 981 in lane 2 is less than 1650 for PHF of 0.91=> Better than LOS D
2. The weaving value of 417 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 2259 is less than 3300 for 4-lane freeway at any PHF=> **Better than LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Hybrid (Run D)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	600
SR 56 EB volume weaving from Mainline to Carmel Country Road	1675
SR 56 EB Volume going through before Carmel Creek on-ramp	3697
Total Mainline volume after diverge	4297

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	2249	2142	2169	2091	1811	1617	848
Aux lane	600	992	1143	1327	1559	1675	

NOTES

1. The merge value of 2142 in lane 2 is more than 1650 for PHF of 0.91=> Worse than LOS D
2. The weaving value of 848 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 4980 is more than 3300 for 4-lane freeway at any PHF=>Worse than LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Hyb flyover (Run D1)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	5
Weaving seg length, L (ft)	2500
Terrain	Level

Weaving type	B
Volume ratio, VR	0.38
Weaving ratio, R	0.26

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1675	0.92	2	0	1.5	1.2	0.990	1.00	1838
V_{o2}	42	0.92	2	0	1.5	1.2	0.990	1.00	46
V_{w1}	763	0.92	2	0	1.5	1.2	0.990	1.00	837
V_{w2}	271	0.92	2	0	1.5	1.2	0.990	1.00	297
V_w				1134	V_{nw}				1884
V									3018

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.29	0.16		
Weaving and non-weaving speeds, Si (mi/h)	57.79	62.26		

Number of lanes required for unconstrained operation, Nw 1.81
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	60.50
Weaving segment density, D (pc/mi/ln)	9.98
Level of service, LOS	A
Capacity of base condition, c_b (pc/h)	10284
Capacity as a 15-minute flow rate, c (veh/h)	10182
Capacity as a full-hour volume, c_h (veh/h)	9367

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2015 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2015 Hyb flyover (Run D1)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.36
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3767	0.92	2	0	1.5	1.2	0.990	1.00	4135
V_{o2}	70	0.92	2	0	1.5	1.2	0.990	1.00	76
V_{w1}	1605	0.92	2	0	1.5	1.2	0.990	1.00	1762
V_{w2}	530	0.92	2	0	1.5	1.2	0.990	1.00	581
V_w				2343	V_{nw}				4211
V									6554

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.48	0.33		
Weaving and non-weaving speeds, Si (mi/h)	52.24	56.41		

Number of lanes required for unconstrained operation, Nw 1.78
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	54.85
Weaving segment density, D (pc/mi/ln)	23.90
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	10497
Capacity as a 15-minute flow rate, c (veh/h)	10393
Capacity as a full-hour volume, c_h (veh/h)	9562

Notes

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

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Design Year	Year 2015 Hybrid with flyover (Run D1)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	313
SR 56 EB volume weaving from Mainline to Carmel Country Road	805
SR 56 EB Volume going through before Carmel Creek on-ramp	1633
Total Mainline volume after diverge	1946

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	501	459	478	437	298	203	417
Aux lane	313	492	555	640	750	805	

NOTES

1. The merge value of 459 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 417 is less than1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freewayvolume of 2259 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2015 Hybrid with flyover (Run D1)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	600
SR 56 EB volume weaving from Mainline to Carmel Country Road	1675
SR 56 EB Volume going through before Carmel Creek on-ramp	3697
Total Mainline volume after diverge	4297

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1103	996	1023	945	665	471	848
Aux lane	600	992	1143	1327	1559	1675	

NOTES

1. The merge value of 996 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 848 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 4980 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Year 2030 AM Run E

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2030 AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.99
Weaving seg length, L (ft)	720	Weaving ratio, R	0.45
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	20	0.92	2	0	1.5	1.2	0.990	1.00	21
V_{w1}	1253	0.92	2	0	1.5	1.2	0.990	1.00	1375
V_{w2}	1550	0.92	2	0	1.5	1.2	0.990	1.00	1701
V_w				3076	V_{nw}				21
V									3097

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			3.28	2.41
Weaving and non-weaving speeds, Si (mi/h)			23.17	25.26

Number of lanes required for unconstrained operation, Nw 3.69
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	23.19
Weaving segment density, D (pc/mi/ln)	44.52
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Year 2030 (RUN E)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2030 No Build PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.98
Weaving seg length, L (ft)	720	Weaving ratio, R	0.31
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	110	0.92	2	0	1.5	1.2	0.990	1.00	120
V_{w1}	1417	0.92	2	0	1.5	1.2	0.990	1.00	1555
V_{w2}	3175	0.92	2	0	1.5	1.2	0.990	1.00	3485
V_w				5040	V_{nw}				120
V									5160

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			4.61	3.82
Weaving and non-weaving speeds, Si (mi/h)			21.24	22.25

Number of lanes required for unconstrained operation, Nw 3.62
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☒ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	21.27
Weaving segment density, D (pc/mi/ln)	80.88
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 AM Run E

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030 No Build

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.51
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.23
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	3189	0.92	2	0	1.5	1.2	0.990	1.00	3500
V_{o2}	152	0.92	2	0	1.5	1.2	0.990	1.00	166
V_{w1}	2635	0.92	2	0	1.5	1.2	0.990	1.00	2892
V_{w2}	809	0.92	2	0	1.5	1.2	0.990	1.00	888
V_w				3780	V_{nw}				3666
V									7446

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving Intensity factor, Wi	1.42	1.76		
Weaving and non-weaving speeds, Si (mi/h)	37.77	34.94		

Number of lanes required for unconstrained operation, Nw 2.12
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	36.32
Weaving segment density, D (pc/mi/ln)	68.33
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	5203
Capacity as a 15-minute flow rate, c (veh/h)	5151
Capacity as a full-hour volume, c_h (veh/h).	4739

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM (Run E7)

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.59
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.45
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1123	0.92	2	0	1.5	1.2	0.990	1.00	1232
V_{o2}	230	0.92	2	0	1.5	1.2	0.990	1.00	252
V_{w1}	1052	0.92	2	0	1.5	1.2	0.990	1.00	1154
V_{w2}	877	0.92	2	0	1.5	1.2	0.990	1.00	962
V_w				2116	V_{nw}				1484
V									3600

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.95	1.16		
Weaving and non-weaving speeds, Si (mi/h)	43.15	40.47		

Number of lanes required for unconstrained operation, Nw 2.28
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	42.00
Weaving segment density, D (pc/mi/ln)	28.57
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	4944
Capacity as a 15-minute flow rate, c (veh/h)	4895
Capacity as a full-hour volume, c_h (veh/h)	4503

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 No Build AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Run E

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.35
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.33
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1844	0.92	2	0	1.5	1.2	0.990	1.00	2024
V_{o2}	37	0.92	2	0	1.5	1.2	0.990	1.00	40
V_{w1}	673	0.92	2	0	1.5	1.2	0.990	1.00	738
V_{w2}	335	0.92	2	0	1.5	1.2	0.990	1.00	367
V_w				1105	V_{nw}				2064
V									3169

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.40	0.25		
Weaving and non-weaving speeds, Si (mi/h)	54.17	58.85		

Number of lanes required for unconstrained operation, Nw 1.02
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	57.13
Weaving segment density, D (pc/mi/ln)	18.49
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	6466
Capacity as a 15-minute flow rate, c (veh/h)	6402
Capacity as a full-hour volume, c_h (veh/h)	5890

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 No Build PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Run E

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.41
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.28
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3318	0.92	2	0	1.5	1.2	0.990	1.00	3642
V_{o2}	75	0.92	2	0	1.5	1.2	0.990	1.00	82
V_{w1}	1680	0.92	2	0	1.5	1.2	0.990	1.00	1844
V_{w2}	663	0.92	2	0	1.5	1.2	0.990	1.00	727
V_w				2571	V_{nw}				3724
V									6295

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.72	0.66		
Weaving and non-weaving speeds, Si (mi/h)	47.00	48.23		

Number of lanes required for unconstrained operation, Nw 1.33
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	47.72
Weaving segment density, D (pc/mi/ln)	43.97
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6185
Capacity as a 15-minute flow rate, c (veh/h)	6124
Capacity as a full-hour volume, c_h (veh/h)	5634

Notes

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

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Design Year	Year 2030 No Build (Run E)
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	3
total segment length (ft)	720
Total ECR on ramp volume	1570
Total Carmel Creek Off ramp volume	1273
SR 56 EB Volume going through	1267
Total Mainline volume after diverge	2837

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1463	1815	2223	1321
Aux lane	1570	1281		1273

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1815 in lane 2 is more than 1650 for PHF of 0.91=> **WORSE THAN LOS D**
2. The weaving value of 2223 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 2829 is less than 3300 for PHF of 0.91 => Better than LOS D

Weaving length = 720'. Used 1000' for analysis purposes.

Design Year	Year 2030 No Build (Run E)
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2
total segment length (ft)	720
Total ECR on ramp volume	3285
Total Carmel Creek Off ramp volume	1527
SR 56 EB Volume going through	2523
Total Mainline volume after diverge	5808

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2334	3878	3789	3117
Aux lane	3285	1818		1527

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 3878 in lane 2 is over 1650 for PHF of 0.91=> **LOS F**
2. The weaving value of 3789 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 5517 is more than 3300 for PHF of 0.91 => **Worse than LOS D**

Weaving length = 720', Used 1000' for analysis purposes.

Design Year	Year 2030 No Build (Run E)
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	961
Total off ramp volume to El Camino Real	2787
SR 56 WB Volume going through	3037
Total Mainline volume after diverge	3998

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2830	1620	2887	836
Aux lane	961	2310		2787

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1620 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 2887 is more than 1650 for any PHF=> **Worse than LOS D**
3. The total freeway volume of 4475 is more than 3300 for 4-lane freeway at any PHF=>**Worse than LOS D**

Design Year	Year 2030 No Build (Run E)
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4
total segment length (ft)	1000
Total Carmel Creek on ramp volume	1107
Total Off ramp volume to El Camino Real	1282
SR 56 WB Volume going through	893
Total Mainline volume after diverge	2000

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1271	1247	1860	806
Aux lane	1107	1196		1282

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1247 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1860 is more than 1650 for PHF of 0.91=> **Worse THAN LOS D**
3. The total freeway volume of 2086 is less than 3300 for 4-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

Design Year	Year 2030 No Build (Run E)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500'
Total Carmel Creek on ramp volume	372
SR 56 EB volume weaving from Mainline to Carmel Country Road	710
SR 56 EB Volume going through before Carmel Creek on-ramp	1807
Total Mainline volume after diverge	2179

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	435	434	474	426	288	194	404
Aux lane	372	493	512	573	664	710	

NOTES

1. The merge value of 434 in lane 2 is below 1650 for PHF of 0.91 => **BETTER LOS D**
2. The weaving value of 404 is less than1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 2396 is less than 3300 for 4-lane freeway at any PHF=> BETTER THAN **LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 No Build (Run E)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500'
Total Carmel Creek on ramp volume	738
SR 56 EB volume weaving from Mainline to Carmel Country Road	1755
SR 56 EB Volume going through before Carmel Creek on-ramp	3243
Total Mainline volume after diverge	3981

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1002	931	986	890	579	364	930
Aux lane	738	1107	1223	1400	1637	1755	

NOTES

1. The merge value of 931 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 930 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 4629 is more than 3300 for 4-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 AM Run F

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030 Aux.Lane (Run F)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	4
Weaving seg length, L (ft)	1100
Terrain	Level
Weaving type	B
Volume ratio, VR	0.51
Weaving ratio, R	0.23

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3189	0.92	2	0	1.5	1.2	0.990	1.00	3500
V_{o2}	152	0.92	2	0	1.5	1.2	0.990	1.00	166
V_{w1}	2635	0.92	2	0	1.5	1.2	0.990	1.00	2892
V_{w2}	809	0.92	2	0	1.5	1.2	0.990	1.00	888
V_w				3780	V_{nw}				3666
V									7446

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.16	1.32		
Weaving and non-weaving speeds, Si (mi/h)	40.49	38.72		

Number of lanes required for unconstrained operation, Nw	2.75
Maximum number of lanes, Nw (max)	3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	39.60
Weaving segment density, D (pc/mi/ln)	47.01
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6940
Capacity as a 15-minute flow rate, c (veh/h)	6871
Capacity as a full-hour volume, c_h (veh/h)	6321

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030 Aux. Lane (Run F)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	4	Volume ratio, VR	0.59
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.45
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	1123	0.92	2	0	1.5	1.2	0.990	1.00	1232
V_{o2}	230	0.92	2	0	1.5	1.2	0.990	1.00	252
V_{w1}	1052	0.92	2	0	1.5	1.2	0.990	1.00	1154
V_{w2}	877	0.92	2	0	1.5	1.2	0.990	1.00	962
V_w				2116	V_{nw}				1484
V									3600

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.78	0.87		
Weaving and non-weaving speeds, Si (mi/h)	45.90	44.42		

Number of lanes required for unconstrained operation, Nw 2.95
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	45.28
Weaving segment density, D (pc/mi/ln)	19.88
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	6567
Capacity as a 15-minute flow rate, c (veh/h)	6502
Capacity as a full-hour volume, c_h (veh/h)	5982

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	No EB Slip Ramp

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Aux Lane AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.40
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1858	0.92	2	0	1.5	1.2	0.990	1.00	2039
V_{o2}	51	0.92	2	0	1.5	1.2	0.990	1.00	55
V_{w1}	972	0.92	2	0	1.5	1.2	0.990	1.00	1067
V_{w2}	321	0.92	2	0	1.5	1.2	0.990	1.00	352
V_w				1419	V_{nw}				2094
V									3513

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.47	0.36		
Weaving and non-weaving speeds, Si (mi/h)	52.30	55.48		

Number of lanes required for unconstrained operation, Nw 1.22
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	54.15
Weaving segment density, D (pc/mi/ln)	21.62
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	6204
Capacity as a 15-minute flow rate, c (veh/h)	6143
Capacity as a full-hour volume, c_h (veh/h)	5652

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	No EB Slip off-ramp

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Aux Lane PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	2500
Terrain	Level

Weaving type	B
Volume ratio, VR	0.44
Weaving ratio, R	0.24

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3333	0.92	2	0	1.5	1.2	0.990	1.00	3659
V_{o2}	90	0.92	2	0	1.5	1.2	0.990	1.00	98
V_{w1}	2019	0.92	2	0	1.5	1.2	0.990	1.00	2216
V_{w2}	648	0.92	2	0	1.5	1.2	0.990	1.00	711
V_w				2927	V_{nw}				3757
V									6684

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.78	0.79		
Weaving and non-weaving speeds, Si (mi/h)	45.82	45.77		

Number of lanes required for unconstrained operation, Nw 1.46
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	45.79
Weaving segment density, D (pc/mi/ln)	48.66
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6065
Capacity as a 15-minute flow rate, c (veh/h)	6005
Capacity as a full-hour volume, c_h (veh/h)	5525

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	With WB Barrier F(3)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Aux Lane AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.36
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.34
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1822	0.92	2	0	1.5	1.2	0.990	1.00	2000
V_{o2}	38	0.92	2	0	1.5	1.2	0.990	1.00	41
V_{w1}	695	0.92	2	0	1.5	1.2	0.990	1.00	762
V_{w2}	357	0.92	2	0	1.5	1.2	0.990	1.00	391
V_w				1153	V_{nw}				2041
V									3194

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.41	0.27		
Weaving and non-weaving speeds, Si (mi/h)	53.88	58.29		

Number of lanes required for unconstrained operation, Nw 1.06
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	56.61
Weaving segment density, D (pc/mi/ln)	18.81
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	6407
Capacity as a 15-minute flow rate, c (veh/h)	6344
Capacity as a full-hour volume, c_h (veh/h)	5836

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	With WB barrier FC37

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Aux Lane PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	3
Weaving seg length, L (ft)	2500
Terrain	Level
Weaving type	B
Volume ratio, VR	0.41
Weaving ratio, R	0.29

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3294	0.92	2	0	1.5	1.2	0.990	1.00	3616
V_{o2}	76	0.92	2	0	1.5	1.2	0.990	1.00	83
V_{w1}	1704	0.92	2	0	1.5	1.2	0.990	1.00	1870
V_{w2}	687	0.92	2	0	1.5	1.2	0.990	1.00	754
V_w				2624	V_{nw}				3699
V									6323

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.73	0.68		
Weaving and non-weaving speeds, Si (mi/h)	46.82	47.80		

Number of lanes required for unconstrained operation, Nw 1.36
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	47.39
Weaving segment density, D (pc/mi/ln)	44.48
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6159
Capacity as a 15-minute flow rate, c (veh/h)	6098
Capacity as a full-hour volume, c_h (veh/h)	5610

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	No slip With WB Barrier F(4)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Aux Lane AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.42
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.26
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1822	0.92	2	0	1.5	1.2	0.990	1.00	2000
V_{o2}	38	0.92	2	0	1.5	1.2	0.990	1.00	41
V_{w1}	1008	0.92	2	0	1.5	1.2	0.990	1.00	1106
V_{w2}	357	0.92	2	0	1.5	1.2	0.990	1.00	391
V_w				1497	V_{nw}				2041
V									3538

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.49	0.39		
Weaving and non-weaving speeds, Si (mi/h)	51.88	54.52		

Number of lanes required for unconstrained operation, Nw 1.29
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	53.37
Weaving segment density, D (pc/mi/ln)	22.10
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	6125
Capacity as a 15-minute flow rate, c (veh/h)	6064
Capacity as a full-hour volume, c_h (veh/h)	5579

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	No Slip With WB barrier F(4)

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Aux Lane PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.45
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3294	0.92	2	0	1.5	1.2	0.990	1.00	3616
V_{o2}	76	0.92	2	0	1.5	1.2	0.990	1.00	83
V_{w1}	2058	0.92	2	0	1.5	1.2	0.990	1.00	2259
V_{w2}	687	0.92	2	0	1.5	1.2	0.990	1.00	754
V_w				3013	V_{nw}				3699
V									6712

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.80	0.83		
Weaving and non-weaving speeds, Si (mi/h)	45.55	45.09		

Number of lanes required for unconstrained operation, Nw 1.51
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	45.29
Weaving segment density, D (pc/mi/ln)	49.39
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6020
Capacity as a 15-minute flow rate, c (veh/h)	5960
Capacity as a full-hour volume, c_h (veh/h)	5483

Notes

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

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Design Year	Year 2030 Aux Lane (Run 1) (No EB SI ramp)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

F(2)

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	372
SR 56 EB volume weaving from Mainline to Carmel Country Road	1023
SR 56 EB Volume going through before Carmel Creek on-ramp	1807
Total Mainline volume after diverge	2179

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	922	859	877	828	656	537	520
Aux lane	372	609	699	811	952	1023	

NOTES

1. The merge value of 859 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 520 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 2593 is less than 3300 for 4-lane freeway at any PHF=> BETTER THAN **LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

F(2)

Design Year	Year 2030 Aux lane (Run F) (No EB SR ramp)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	738
SR 56 EB volume weaving from Mainline to Carmel Country Road	2109
SR 56 EB Volume going through before Carmel Creek on-ramp	3243
Total Mainline volume after diverge	3981

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	2267	2126	2155	2069	1709	1467	1061
Aux lane	738	1238	1435	1669	1962	2109	

NOTES

1. The merge value of 2126 in lane 2 is more than 1650 for PHF of 0.91=> **Worse than LOS D**
2. The weaving value of 1061 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 4852 is more than 3300 for 4-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 Aux Lane (Run 6) (With Barrier)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

F(3)

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	395
SR 56 EB volume weaving from Mainline to Carmel Country Road	733
SR 56 EB Volume going through before Carmel Creek on-ramp	1784
Total Mainline volume after diverge	2179

Merge — Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	783	787	830	779	635	537	421
Aux lane	395	516	531	593	686	733	

NOTES

1. The merge value of 787 in lane 2 is below 1650 for PHF of 0.91 => BETTER LOS D
2. The weaving value of 421 is less than1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 2396 is less than 3300 for 4-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

F(3)

Design Year	Year 2030 AuxLane (Run 6) (Van Borren)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	763
SR 56 EB volume weaving from Mainline to Carmel Country Road	1780
SR 56 EB Volume going through before Carmel Creek on-ramp	3218
Total Mainline volume after diverge	3981

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	2106	2040	2098	1999	1681	1463	949
Aux lane	763	1132	1243	1421	1660	1780	

NOTES

1. The merge value of 2040 in lane 2 is more than 1650 for PHF of 0.91=> **WORSE THAN LOS D**
2. The weaving value of 949 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 4629 is more than 3300 for 4-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 Aux Lane Run 5 (No S/a + With barrier)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

F(4)

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	395
SR 56 EB volume weaving from Mainline to Carmel Country Road	1046
SR 56 EB Volume going through before Carmel Creek on-ramp	1784
Total Mainline volume after diverge	2179

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	927	868	890	838	650	537	537
Aux lane	395	632	718	831	974	1046	

NOTES

1. The merge value of 868 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 537 is less than1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 2593 is less than 3300 for 4-lane freeway at any PHF=> BETTER THAN **LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 Aux Lane (Run F) (NO Slip + With Barrier)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

F(4)

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	763
SR 56 EB volume weaving from Mainline to Carmel Country Road	2134
SR 56 EB Volume going through before Carmel Creek on-ramp	3218
Total Mainline volume after diverge	3981

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	2269	2132	2166	2067	1700	1463	1080
Aux lane	763	1263	1456	1691	1986	2134	

NOTES

1. The merge value of 2132 in lane 2 is more than 1650 for PHF of 0.91=> **Worse than LOS D**
2. The weaving value of 1080 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 4852 is more than 3300 for 4-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Year 2030 AM Run G

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2030 AM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.99
Weaving seg length, L (ft)	720	Weaving ratio, R	0.42
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	20	0.92	2	0	1.5	1.2	0.990	1.00	21
V_{w1}	1253	0.92	2	0	1.5	1.2	0.990	1.00	1375
V_{w2}	920	0.92	2	0	1.5	1.2	0.990	1.00	1009
V_w				2384	V_{nw}				21
V									2405

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			2.74	1.86
Weaving and non-weaving speeds, Si (mi/h)			24.35	27.23

Number of lanes required for unconstrained operation, Nw 3.69
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	24.37
Weaving segment density, D (pc/mi/ln)	32.89
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans D 11
Date Performed	1/2/2008
Analysis Time Period	Year 2030 AM Run G

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn ECR and CCR Rd
Jurisdiction	Caltrans
Analysis Year	Year 2030 PM

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	45	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.97
Weaving seg length, L (ft)	720	Weaving ratio, R	0.38
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	0	0.92	2	0	1.5	1.2	0.990	1.00	0
V_{o2}	110	0.92	2	0	1.5	1.2	0.990	1.00	120
V_{w1}	1417	0.92	2	0	1.5	1.2	0.990	1.00	1555
V_{w2}	2297	0.92	2	0	1.5	1.2	0.990	1.00	2521
V_w				4076	V_{nw}				120
V									4196

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.08	0.00
b (Exhibit 24-6)			2.20	6.00
c (Exhibit 24-6)			0.70	1.00
d (Exhibit 24-6)			0.50	0.50
Weaving intensity factor, Wi			3.96	3.06
Weaving and non-weaving speeds, Si (mi/h)			22.05	23.62

Number of lanes required for unconstrained operation, Nw 3.62
Maximum number of lanes, Nw (max) 3.50

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	22.10
Weaving segment density, D (pc/mi/ln)	63.30
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	3698
Capacity as a 15-minute flow rate, c (veh/h)	3661
Capacity as a full-hour volume, c_h (veh/h)	3368

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 AM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	4	Volume ratio, VR	0.34
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.34
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4863	0.92	2	0	1.5	1.2	0.990	1.00	5338
V_{o2}	96	0.92	2	0	1.5	1.2	0.990	1.00	105
V_{w1}	1664	0.92	2	0	1.5	1.2	0.990	1.00	1826
V_{w2}	865	0.92	2	0	1.5	1.2	0.990	1.00	949
V_w				2775	V_{nw}				5443
V									8218

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.95	0.71		
Weaving and non-weaving speeds, Si (mi/h)	43.16	47.17		

Number of lanes required for unconstrained operation, Nw 1.85
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	45.73
Weaving segment density, D (pc/mi/ln)	44.92
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	7941
Capacity as a 15-minute flow rate, c (veh/h)	7862
Capacity as a full-hour volume, c_h (veh/h)	7233

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	4	Volume ratio, VR	0.40
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.33
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2154	0.92	2	0	1.5	1.2	0.990	1.00	2364
V_{o2}	111	0.92	2	0	1.5	1.2	0.990	1.00	121
V_{w1}	489	0.92	2	0	1.5	1.2	0.990	1.00	536
V_{w2}	996	0.92	2	0	1.5	1.2	0.990	1.00	1093
V_w				1629	V_{nw}				2485
V									4114

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.65	0.46		
Weaving and non-weaving speeds, Si (mi/h)	48.43	52.70		

Number of lanes required for unconstrained operation, Nw 2.00
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	50.92
Weaving segment density, D (pc/mi/ln)	20.20
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	7553
Capacity as a 15-minute flow rate, c (veh/h)	7478
Capacity as a full-hour volume, c_h (veh/h)	6880

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Shankar	Freeway/Dir of Travel	SR 56 WB
Agency/Company	Caltrans/ LLG	Weaving Seg Location	Btwn CCR and ECR
Date Performed	9/27/2007	Jurisdiction	D 11
Analysis Time Period	Year 2030 AM	Analysis Year	Year 2030 (C-D system)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.57
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.16
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1240	0.92	2	0	1.5	1.2	0.990	1.00	1361
V_{o2}	329	0.92	2	0	1.5	1.2	0.990	1.00	361
V_{w1}	1760	0.92	2	0	1.5	1.2	0.990	1.00	1932
V_{w2}	329	0.92	2	0	1.5	1.2	0.990	1.00	361
V_w				2293	V_{nw}				1722
V									4015

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.01	1.21		
Weaving and non-weaving speeds, Si (mi/h)	42.42	39.84		

Number of lanes required for unconstrained operation, Nw 2.24
Maximum number of lanes, Nw (max) 3.50

If Nw < Nw(max) unconstrained operation if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	41.27
Weaving segment density, D (pc/mi/ln)	32.43
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	4998
Capacity as a 15-minute flow rate, c (veh/h)	4949
Capacity as a full-hour volume, c_h (veh/h)	4553

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030 (C-D system)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.52
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.36
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	541	0.92	2	0	1.5	1.2	0.990	1.00	593
V_{o2}	343	0.92	2	0	1.5	1.2	0.990	1.00	376
V_{w1}	600	0.92	2	0	1.5	1.2	0.990	1.00	658
V_{w2}	343	0.92	2	0	1.5	1.2	0.990	1.00	376
V_w				1034	V_{nw}				969
V									2003

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.57	0.49		
Weaving and non-weaving speeds, Si (mi/h)	49.99	51.93		

Number of lanes required for unconstrained operation, Nw 1.88
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	50.91
Weaving segment density, D (pc/mi/ln)	13.11
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	5175
Capacity as a 15-minute flow rate, c (veh/h)	5124
Capacity as a full-hour volume, c_h (veh/h)	4714

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.28
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.32
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2562	0.92	2	0	1.5	1.2	0.990	1.00	2812
V_{o2}	35	0.92	2	0	1.5	1.2	0.990	1.00	38
V_{w1}	675	0.92	2	0	1.5	1.2	0.990	1.00	741
V_{w2}	320	0.92	2	0	1.5	1.2	0.990	1.00	351
V_w				1092	V_{nw}				2850
V									3942

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.29	0.14		
Weaving and non-weaving speeds, Si (mi/h)	57.57	63.38		

Number of lanes required for unconstrained operation, Nw 1.34
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	61.66
Weaving segment density, D (pc/mi/ln)	12.79
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	11303
Capacity as a 15-minute flow rate, c (veh/h)	11191
Capacity as a full-hour volume, c_h (veh/h)	10296

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	5
Weaving seg length, L (ft)	2500
Terrain	Level
Weaving type	B
Volume ratio, VR	0.33
Weaving ratio, R	0.28

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4608	0.92	2	0	1.5	1.2	0.990	1.00	5058
V_{o2}	72	0.92	2	0	1.5	1.2	0.990	1.00	79
V_{w1}	1683	0.92	2	0	1.5	1.2	0.990	1.00	1847
V_{w2}	643	0.92	2	0	1.5	1.2	0.990	1.00	705
V_w				2552	V_{nw}				5137
V									7689

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.51	0.34		
Weaving and non-weaving speeds, Si (mi/h)	51.39	55.94		

Number of lanes required for unconstrained operation, Nw 1.65
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	54.34
Weaving segment density, D (pc/mi/ln)	28.30
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	10797
Capacity as a 15-minute flow rate, c (veh/h)	10690
Capacity as a full-hour volume, c_h (veh/h)	9835

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11 G(2)
Analysis Year	Year 2030_No EB slip ramp

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.33
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.24
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	2557	0.92	2	0	1.5	1.2	0.990	1.00	2807
V_{o2}	50	0.92	2	0	1.5	1.2	0.990	1.00	54
V_{w1}	973	0.92	2	0	1.5	1.2	0.990	1.00	1068
V_{w2}	305	0.92	2	0	1.5	1.2	0.990	1.00	334
V_w				1402	V_{nw}				2861
V									4263

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.34	0.19		
Weaving and non-weaving speeds, Si (mi/h)	56.14	61.30		

Number of lanes required for unconstrained operation, Nw 1.59
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	59.51
Weaving segment density, D (pc/mi/ln)	14.33
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	10832
Capacity as a 15-minute flow rate, c (veh/h)	10725
Capacity as a full-hour volume, c_h (veh/h)	9867

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11 GL2
Analysis Year	Year 2030_No EB slip

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.36
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.24
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4622	0.92	2	0	1.5	1.2	0.990	1.00	5074
V_{o2}	86	0.92	2	0	1.5	1.2	0.990	1.00	94
V_{w1}	2023	0.92	2	0	1.5	1.2	0.990	1.00	2220
V_{w2}	629	0.92	2	0	1.5	1.2	0.990	1.00	690
V_w				2910	V_{nw}				5168
V									8078

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.55	0.41		
Weaving and non-weaving speeds, Si (mi/h)	50.38	54.03		

Number of lanes required for unconstrained operation, Nw 1.83
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	52.65
Weaving segment density, D (pc/mi/ln)	30.68
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	10465
Capacity as a 15-minute flow rate, c (veh/h)	10361
Capacity as a full-hour volume, c_h (veh/h)	9532

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Shankar	Freeway/Dir of Travel	SR 56 EB
Agency/Company	Caltrans/ LLG	Weaving Seg Location	Btwn CCR and C.Country Rd
Date Performed	9/27/2007	Jurisdiction	D 11 GC3
Analysis Time Period	Year 2030 AM	Analysis Year	Year 2030_With WB barrier

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.30
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.34
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2516	0.92	2	0	1.5	1.2	0.990	1.00	2762
V_{o2}	37	0.92	2	0	1.5	1.2	0.990	1.00	40
V_{w1}	721	0.92	2	0	1.5	1.2	0.990	1.00	791
V_{w2}	366	0.92	2	0	1.5	1.2	0.990	1.00	401
V_w				1192	V_{nw}				2802
V									3994

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.31	0.15		
Weaving and non-weaving speeds, Si (mi/h)	57.12	62.70		

Number of lanes required for unconstrained operation, Nw 1.44
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	60.92
Weaving segment density, D (pc/mi/ln)	13.11
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	11179
Capacity as a 15-minute flow rate, c (veh/h)	11068
Capacity as a full-hour volume, c_h (veh/h)	10183

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11 G(4)
Analysis Year	Year 2030_With WB barrier

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.34
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.29
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	4555	0.92	2	0	1.5	1.2	0.990	1.00	5000
V_{o2}	75	0.92	2	0	1.5	1.2	0.990	1.00	82
V_{w1}	1736	0.92	2	0	1.5	1.2	0.990	1.00	1905
V_{w2}	696	0.92	2	0	1.5	1.2	0.990	1.00	764
V_w				2669	V_{nw}				5082
V									7751

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.52	0.37		
Weaving and non-weaving speeds, Si (mi/h)	51.07	55.26		

Number of lanes required for unconstrained operation, Nw 1.73
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	53.74
Weaving segment density, D (pc/mi/ln)	28.85
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	10651
Capacity as a 15-minute flow rate, c (veh/h)	10546
Capacity as a full-hour volume, c_h (veh/h)	9702

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 AM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11 G(4)
Analysis Year	No slip and With WB barrier

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.35
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.26
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	2532	0.92	2	0	1.5	1.2	0.990	1.00	2779
V_{o2}	53	0.92	2	0	1.5	1.2	0.990	1.00	58
V_{w1}	1018	0.92	2	0	1.5	1.2	0.990	1.00	1117
V_{w2}	350	0.92	2	0	1.5	1.2	0.990	1.00	384
V_w				1501	V_{nw}				2837
V									4338

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.35	0.21		
Weaving and non-weaving speeds, Si (mi/h)	55.72	60.59		

Number of lanes required for unconstrained operation, Nw 1.67
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	58.81
Weaving segment density, D (pc/mi/ln)	14.75
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	10632
Capacity as a 15-minute flow rate, c (veh/h)	10527
Capacity as a full-hour volume, c_h (veh/h)	9685

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11 GLY
Analysis Year	No slip and With WB barrier

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.37
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	4569	0.92	2	0	1.5	1.2	0.990	1.00	5015
V_{o2}	89	0.92	2	0	1.5	1.2	0.990	1.00	97
V_{w1}	2076	0.92	2	0	1.5	1.2	0.990	1.00	2279
V_{w2}	682	0.92	2	0	1.5	1.2	0.990	1.00	748
V_w				3027	V_{nw}				5112
V									8139

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.57	0.43		
Weaving and non-weaving speeds, Si (mi/h)	50.08	53.35		

Number of lanes required for unconstrained operation, Nw 1.91
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	52.08
Weaving segment density, D (pc/mi/ln)	31.25
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	10329
Capacity as a 15-minute flow rate, c (veh/h)	10227
Capacity as a full-hour volume, c_h (veh/h)	9409

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Shankar	Freeway/Dir of Travel	SR 56 EB
Agency/Company	Caltrans/ LLG	Weaving Seg Location	Btwn CCR and C.Country Rd
Date Performed	9/27/2007	Jurisdiction	D 11
Analysis Time Period	Year 2030 SR 56 Build	Analysis Year	With WB C-D G(5)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.34
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	2553	0.92	2	0	1.5	1.2	0.990	1.00	2802
V_{o2}	50	0.92	2	0	1.5	1.2	0.990	1.00	54
V_{w1}	997	0.92	2	0	1.5	1.2	0.990	1.00	1094
V_{w2}	329	0.92	2	0	1.5	1.2	0.990	1.00	361
V_w				1455	V_{nw}				2856
V									4311

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.34	0.20		
Weaving and non-weaving speeds, Si (mi/h)	55.91	60.93		

Number of lanes required for unconstrained operation, Nw 1.63
Maximum number of lanes, Nw (max) 3.50

If Nw < Nw(max) unconstrained operation if Nw > Nw (max) constrained operation

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S (mi/h)	59.14
Weaving segment density, D (pc/mi/ln)	14.58
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	10731
Capacity as a 15-minute flow rate, c (veh/h)	10625
Capacity as a full-hour volume, c_h (veh/h)	9775

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 SR 56 Build

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	With WB C-D PM 9(5)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.37
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.24
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	fp	v
V_{o1}	4596	0.92	2	0	1.5	1.2	0.990	1.00	5045
V_{o2}	85	0.92	2	0	1.5	1.2	0.990	1.00	93
V_{w1}	2049	0.92	2	0	1.5	1.2	0.990	1.00	2249
V_{w2}	655	0.92	2	0	1.5	1.2	0.990	1.00	719
V_w				2968	V_{nw}				5138
V									8106

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.56	0.42		
Weaving and non-weaving speeds, Si (mi/h)	50.23	53.69		

Number of lanes required for unconstrained operation, Nw 1.87
Maximum number of lanes, Nw (max) 3.50

☒ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	52.37
Weaving segment density, D (pc/mi/ln)	30.96
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	10396
Capacity as a 15-minute flow rate, c (veh/h)	10293
Capacity as a full-hour volume, c_h (veh/h)	9470

Notes

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

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Plan G, G(3)

Design Year	Year 2030
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road Btwn ECR and C.Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	3
total segment length (ft)	720
Total ECR on ramp volume	940
Total Carmel Creek Off ramp volume	1273
SR 56 EB Volume going through	2317
Total Mainline volume after diverge	3257

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	1904	1753	1719	1334
Aux lane	940	1155		1273

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1753 in lane 2 is more than 1650 for PHF of 0.91=> **WORSE THAN LOS D**
2. The weaving value of 1719 is more than 1650 for 0.91 PHF=> **Worse than LOS D**
3. The total freeway volume of 3375 is more than 3300 for PHF of 0.91 => **Worse than LOS D**

Weaving length = 720'. Used 1000' for analysis purposes.

Run G, G(3)

Design Year	Year 2030
Freeway & Direction	SR 56 EB
Freeway Segment	Frontage Road btwn ECR and C.Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	3
total segment length (ft)	720
Total ECR on ramp volume	2407
Total Carmel Creek Off ramp volume	1527
SR 56 EB Volume going through	3994
Total Mainline volume after diverge	6401

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	3048	3890	3086	3234
Aux lane	2407	1642		1527

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 3890 in lane 2 is over 1650 for PHF of 0.91=> **LOS F**
2. The weaving value of 3086 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 6286 is more than 3300 for PHF of 0.91 => **Worse than LOS D**

Weaving length = 720'. Used 1000' for analysis purposes.

Run 6, 6(2)

Design Year	Year 2030
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	AM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	4
total segment length (ft)	1000
Total Carmel Creek on ramp volume	961
Total off ramp volume to El Camino Real	1760
SR 56 WB Volume going through	4767
Total Mainline volume after diverge	5728

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2101	1620	2106	1083
Aux lane	961	1530		1760

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1620 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 2106 is more than 1650 for any PHF=> **LOS F**
3. The total freeway volume of 5958 is less than 6600 for 8-lane freeway at any PHF=> **LOS F**

Run G, G(2)

Design Year	Year 2030
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4
total segment length (ft)	1000
Total Carmel Creek on ramp volume	1107
Total Off ramp volume to El Camino Real	600
SR 56 WB Volume going through	2043
Total Mainline volume after diverge	3150

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	733	1193	1342	916
Aux lane	1107	677		600

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1193 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1342 is less than 1650 for PHF of 0.91=> **BETTER THAN LOS D**
3. The total freeway volume of 3073 is less than 6600 for 8-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

G(5)

Design Year	Year 2030 Run G with WB C-D
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	819
Total off ramp volume to El Camino Real	2089
SR 56 WB Volume going through	911
Total Mainline volume after diverge	1730

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2039	1211	2243	612
Aux lane	819	1751		2089

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1211 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 2243 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 2068 is less than 4900 for 6-lane freeway at any PHF=> **LOS F**

6(5)

Design Year	Year 2030 Run G with WB C-D
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	952
Total Off ramp volume to El Camino Real	600
SR 56 WB Volume going through	198
Total Mainline volume after diverge	1150

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	582	917	1218	659
Aux lane	952	646		600

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1193 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1218 is less than 1650 for PHF of 0.91=> **BETTER THAN LOS D**
3. The total freeway volume of 1104 is less than 4900 for 8-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

Run 6.

Design Year	Year 2030
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	355
SR 56 EB volume weaving from Mainline to Carmel Country Road	710
SR 56 EB Volume going through before Carmel Creek on-ramp	2177
Total Mainline volume after diverge	2532

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2000'	Weaving at 500'
Lane 1							
Lane 2	457	450	486	439	305	212	398
Aux lane	355	483	508	572	664	710	

NOTES

1. The merge value of 450 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 398 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 3109 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN **LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)						
Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)						
Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Run G.

Design Year	Year 2030
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2000
Total Carmel Creek on ramp volume	715
SR 56 EB volume weaving from Mainline to Carmel Country Road	1755
SR 56 EB Volume going through before Carmel Creek on-ramp	3736
Total Mainline volume after diverge	4451

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2000'	Weaving at 500'
Lane 1							
Lane 2	1330	1251	1300	1207	939	687	921
Aux lane	715	1093	1217	1398	1636	1755	

NOTES

1. The merge value of 1251 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 921 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 5913 is more than 4900 for 6-lane freeway at any PHF=>WORSE THAN LOS D

Percentages for 2000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 (No Slip ramp) 6x27
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	355
SR 56 EB volume weaving from Mainline to Carmel Country Road	1023
SR 56 EB Volume going through before Carmel Creek on-ramp	2527
Total Mainline volume after diverge	2882

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	622	553	566	520	351	233	513
Aux lane	355	599	695	809	952	1023	

NOTES

1. The merge value of 553 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 513 is less than1650 for any PHF=> BETTER THAN LOS D
3. The total freeway volume of 3306 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 (No Slip ramp) (GL02)
Freeway & Direction	SR56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	715
SR 56 EB volume weaving from Mainline to Carmel Country Road	2109
SR 56 EB Volume going through before Carmel Creek on-ramp	4536
Total Mainline volume after diverge	5251

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1787	1637	1660	1568	1221	981	1052
Aux lane	715	1224	1430	1667	1962	2109	

NOTES

1. The merge value of 1637 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 1052 is less than 1650 for any PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 6136 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 (With Barrier) 6(3)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	403
SR 56 EB volume weaving from Mainline to Carmel Country Road	758
SR 56 EB Volume going through before Carmel Creek on-ramp	2479
Total Mainline volume after diverge	2882

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	497	499	543	490	342	241	434
Aux lane	403	530	547	612	709	758	

NOTES

1. The merge value of 499 in lane 2 is below 1650 for PHF of 0.91 => BETTER LOS D
2. The weaving value of 434 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 3110 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

G(3)

Design Year	Year 2030 (With Barrier)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	771
SR 56 EB volume weaving from Mainline to Carmel Country Road	1811
SR 56 EB Volume going through before Carmel Creek on-ramp	4480
Total Mainline volume after diverge	5251

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1460	1391	1449	1349	1027	805	963
Aux lane	771	1148	1264	1446	1689	1811	

NOTES

1. The merge value of 1391 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 963 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 5914 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 (No slip and With Barrier) 6(4)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	403
SR 56 EB volume weaving from Mainline to Carmel Country Road	1071
SR 56 EB Volume going through before Carmel Creek on-ramp	2479
Total Mainline volume after diverge	2882

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	641	580	602	550	367	241	549
Aux lane	403	646	735	850	997	1071	

NOTES

1. The merge value of 580 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 549 is less than1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 3307 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

6(4)

Design Year	Year 2030 (Nexus plan w/ Carmel)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	771
SR 56 EB volume weaving from Mainline to Carmel Country Road	2165
SR 56 EB Volume going through before Carmel Creek on-ramp	4480
Total Mainline volume after diverge	5251

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1623	1483	1517	1410	1059	805	1094
Aux lane	771	1279	1476	1715	2015	2165	

NOTES

1. The merge value of 1483 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 1094 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 6137 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 (With WB C-D) (OPT 5)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	379
SR 56 EB volume weaving from Mainline to Carmel Country Road	1047
SR 56 EB Volume going through before Carmel Creek on-ramp	2503
Total Mainline volume after diverge	2882

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	632	566	584	535	369	297	531
Aux lane	379	622	715	830	975	1047	

NOTES

1. The merge value of 566 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 531 is less than1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 3007 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 (With WB C-D) 6,137
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	3 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	740
SR 56 EB volume weaving from Mainline to Carmel Country Road	2134
SR 56 EB Volume going through before Carmel Creek on-ramp	4511
Total Mainline volume after diverge	5251

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1794	1648	1676	1580	1227	982	1071
Aux lane	740	1248	1451	1688	1985	2134	

NOTES

1. The merge value of 1648 in lane 2 is below 1650 for PHF of 0.91 => **BETTER LOS D**
2. The weaving value of 1071 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 6137 is more than 4900 for 6-lane freeway at any PHF=>**WORSE THAN LOS D**

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 AM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030 Hybrid (Rw H)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.57
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.16
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1240	0.92	2	0	1.5	1.2	0.990	1.00	1361
V_{o2}	329	0.92	2	0	1.5	1.2	0.990	1.00	361
V_{w1}	1760	0.92	2	0	1.5	1.2	0.990	1.00	1932
V_{w2}	329	0.92	2	0	1.5	1.2	0.990	1.00	361
V_w				2293	V_{nw}				1722
V									4015

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.01	1.21		
Weaving and non-weaving speeds, Si (mi/h)	42.42	39.84		

Number of lanes required for unconstrained operation, Nw	2.24
Maximum number of lanes, Nw (max)	3.50

☒ If Nw < Nw(max) unconstrained operation ☐ If Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	41.27
Weaving segment density, D (pc/mi/ln)	32.43
Level of service, LOS	D
Capacity of base condition, c_b (pc/h)	4998
Capacity as a 15-minute flow rate, c (veh/h)	4949
Capacity as a full-hour volume, c_h (veh/h)	4553

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	Year 2030 PM

Site Information

Freeway/Dir of Travel	SR 56 WB
Weaving Seg Location	Btwn CCR and ECR
Jurisdiction	D 11
Analysis Year	Year 2030 Hy Grid (Run H)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.52
Weaving seg length, L (ft)	1100	Weaving ratio, R	0.36
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	541	0.92	2	0	1.5	1.2	0.990	1.00	593
V_{o2}	343	0.92	2	0	1.5	1.2	0.990	1.00	376
V_{w1}	600	0.92	2	0	1.5	1.2	0.990	1.00	658
V_{w2}	343	0.92	2	0	1.5	1.2	0.990	1.00	376
V_w				1034	V_{nw}				969
V									2003

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.57	0.49		
Weaving and non-weaving speeds, Si (mi/h)	49.99	51.93		

Number of lanes required for unconstrained operation, Nw 1.88
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ If Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	50.91
Weaving segment density, D (pc/mi/ln)	13.11
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	5175
Capacity as a 15-minute flow rate, c (veh/h)	5124
Capacity as a full-hour volume, c_h (veh/h)	4714

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Shankar	Freeway/Dir of Travel	SR 56 EB
Agency/Company	Caltrans/ LLG	Weaving Seg Location	Btwn CCR and C.Country Rd
Date Performed	9/27/2007	Jurisdiction	D 11
Analysis Time Period		nalysis Year	Year 2030 Hybrid (AM)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.42
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.26
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1822	0.92	2	0	1.5	1.2	0.990	1.00	2000
V_{o2}	38	0.92	2	0	1.5	1.2	0.990	1.00	41
V_{w1}	1008	0.92	2	0	1.5	1.2	0.990	1.00	1106
V_{w2}	357	0.92	2	0	1.5	1.2	0.990	1.00	391
V_w				1497	V_{nw}				2041
V									3538

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving Intensity factor, Wi	0.49	0.39		
Weaving and non-weaving speeds, Si (mi/h)	51.88	54.52		

Number of lanes required for unconstrained operation, Nw 1.29
Maximum number of lanes, Nw (max) 3.50

If Nw < Nw(max) unconstrained operation if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	53.37
Weaving segment density, D (pc/mi/ln)	22.10
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	6125
Capacity as a 15-minute flow rate, c (veh/h)	6064
Capacity as a full-hour volume, c_h (veh/h)	5579

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Shankar	Freeway/Dir of Travel	SR 56 EB
Agency/Company	Caltrans/ LLG	Weaving Seg Location	Btwn CCR and C.Country Rd
Date Performed	9/27/2007	Jurisdiction	D 11
Analysis Time Period		Analysis Year	Year 2030 Hybrid (PM)

Inputs			
Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	3	Volume ratio, VR	0.45
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3294	0.92	2	0	1.5	1.2	0.990	1.00	3616
V_{o2}	76	0.92	2	0	1.5	1.2	0.990	1.00	83
V_{w1}	2058	0.92	2	0	1.5	1.2	0.990	1.00	2259
V_{w2}	687	0.92	2	0	1.5	1.2	0.990	1.00	754
V_w				3013	V_{nw}				3699
V									6712

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.80	0.83		
Weaving and non-weaving speeds, Si (mi/h)	45.55	45.09		

Number of lanes required for unconstrained operation, Nw 1.51
Maximum number of lanes, Nw (max) 3.50

If Nw < Nw(max) unconstrained operation if Nw > Nw (max) constrained operation

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	45.29
Weaving segment density, D (pc/mi/ln)	49.39
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6020
Capacity as a 15-minute flow rate, c (veh/h)	5960
Capacity as a full-hour volume, c_h (veh/h)	5483

Notes

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

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Year 2030 Hybrid (Rev H)

Design Year
Freeway & Direction SR 56 Westbound
Freeway Segment Carmel Creek Road to El Camino Real
Time Duration AM peak
Analysis Type Weaving

Data Entry

Parameter	Input Value
number of lanes (one direction)	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	819
Total off ramp volume to El Camino Real	2089
SR 56 WB Volume going through	911
Total Mainline volume after diverge	1730

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	2039	1211	2243	612
Aux lane	819	1751		2089

Percentages for 1000 feet weaving section
ON RAMP PERCENTAGES
Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES
Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1211 in lane 2 is less than 1650 for PHF of 0.91=> **Better than LOS D**
2. The weaving value of 2243 is more than 1650 for 0.91 PHF=> **LOS F**
3. The total freeway volume of 2068 is less than 4900 for 6-lane freeway at any PHF=> **LOS F**

Year 2030 Hybrid (Rem H)

Design Year	
Freeway & Direction	SR 56 Westbound
Freeway Segment	Carmel Creek Road to El Camino Real
Time Duration	PM Peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	2 + Aux
total segment length (ft)	1000
Total Carmel Creek on ramp volume	952
Total Off ramp volume to El Camino Real	600
SR 56 WB Volume going through	198
Total Mainline volume after diverge	1150

Weaving

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	Weaving at 500'	1000'
Lane 1				
Lane 2	582	917	1218	659
Aux lane	952	646		600

Percentages for 1000 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2		80%	68%
Aux lane	100%	20%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'
Lane 1			
Lane 2	95%	24%	
Aux lane		76%	100%

RESULTS

1. The merge value of 1193 in lane 2 is below 1650 for PHF of 0.91=> **BETTER THAN LOS D**
2. The weaving value of 1218 is less than 1650 for PHF of 0.91=> **BETTER THAN LOS D**
3. The total freeway volume of 1104 is less than 4900 for 8-lane freeway at PHF of 0.91=>**BETTER THAN LOS D**

[redacted] Year 2030 Hybrid (Rev H) AM

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	395
SR 56 EB volume weaving from Mainline to Carmel Country Road	1046
SR 56 EB Volume going through before Carmel Creek on-ramp	1784
Total Mainline volume after diverge	2179

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'.	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	927	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Aux lane	395	632	718	831	974	1046	

NOTES

1. The merge value of 868 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 537 is less than1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 2593 is less than 3300 for 4-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Year 2032 Hybrid (Run H) PM.

[redacted]

Data Entry

Parameter	Input Value
number of lanes	2 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	763
SR 56 EB volume weaving from Mainline to Carmel Country Road	2134
SR 56 EB Volume going through before Carmel Creek on-ramp	3218
Total Mainline volume after diverge	3981

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	2269	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Aux lane	763	1263	1456	1691	1986	2134	

NOTES

1. The merge value of 2132 in lane 2 is more than 1650 for PHF of 0.91=> **Worse than LOS D**
2. The weaving value of 1080 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 4852 is more than 3300 for 4-lane freeway at any PHF=>WORSE THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	AM peak

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Hyb flyover (Run I)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65
Weaving number of lanes, N	5
Weaving seg length, L (ft)	2500
Terrain	Level

Weaving type	B
Volume ratio, VR	0.41
Weaving ratio, R	0.26

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	1836	0.92	2	0	1.5	1.2	0.990	1.00	2015
V_{o2}	53	0.92	2	0	1.5	1.2	0.990	1.00	58
V_{w1}	994	0.92	2	0	1.5	1.2	0.990	1.00	1091
V_{w2}	343	0.92	2	0	1.5	1.2	0.990	1.00	376
V_w				1467	V_{nw}				2073
V									3540

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.34	0.23		
Weaving and non-weaving speeds, Si (mi/h)	56.07	59.83		

Number of lanes required for unconstrained operation, Nw 2.01
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	58.21
Weaving segment density, D (pc/mi/ln)	12.16
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	9712
Capacity as a 15-minute flow rate, c (veh/h)	9616
Capacity as a full-hour volume, c_h (veh/h)	8847

Notes

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

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Shankar
Agency/Company	Caltrans/ LLG
Date Performed	9/27/2007
Analysis Time Period	PM peak

Site Information

Freeway/Dir of Travel	SR 56 EB
Weaving Seg Location	Btwn CCR and C.Country Rd
Jurisdiction	D 11
Analysis Year	Year 2030 Hyb flyover (Run I)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	65	Weaving type	B
Weaving number of lanes, N	5	Volume ratio, VR	0.44
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	3308	0.92	2	0	1.5	1.2	0.990	1.00	3631
V_{o2}	90	0.92	2	0	1.5	1.2	0.990	1.00	98
V_{w1}	2044	0.92	2	0	1.5	1.2	0.990	1.00	2243
V_{w2}	673	0.92	2	0	1.5	1.2	0.990	1.00	738
V_w				2981	V_{nw}				3729
V									6710

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.56	0.49		
Weaving and non-weaving speeds, Si (mi/h)	50.36	51.98		

Number of lanes required for unconstrained operation, Nw 2.31
Maximum number of lanes, Nw (max) 3.50

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

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

Weaving segment speed, S (mi/h)	51.25
Weaving segment density, D (pc/mi/ln)	26.19
Level of service, LOS	C
Capacity of base condition, c_b (pc/h)	9115
Capacity as a 15-minute flow rate, c (veh/h)	9025
Capacity as a full-hour volume, c_h (veh/h)	8303

Notes

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

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Design Year	Year 2030 Hyb with flyover (Run I)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	AM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	396
SR 56 EB volume weaving from Mainline to Carmel Country Road	1047
SR 56 EB Volume going through before Carmel Creek on-ramp	1783
Total Mainline volume after diverge	2179

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	624	565	587	536	357	234	538
Aux lane	396	633	719	831	975	1047	

NOTES

1. The merge value of 565 in lane 2 is below 1650 for PHF of 0.91=> BETTER LOS D
2. The weaving value of 538 is less than 1650 for 0.91 PHF=> BETTER THAN LOS D
3. The total freeway volume of 2593 is less than 4900 for 6-lane freeway at any PHF=> BETTER THAN LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%

Design Year	Year 2030 Hyb with flyover (Run I)
Freeway & Direction	SR 56 Eastbound
Freeway Segment	Carmel Country Road to Carmel Creek Road
Time Duration	PM peak
Analysis Type	Weaving

Data Entry

Parameter	Input Value
number of lanes	4 + 1 Aux
total segment length (ft)	2500
Total Carmel Creek on ramp volume	763
SR 56 EB volume weaving from Mainline to Carmel Country Road	2134
SR 56 EB Volume going through before Carmel Creek on-ramp	3218
Total Mainline volume after diverge	3981

Merge **Weaving**

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'	Weaving at 500'
Lane 1							
Lane 2	1271	1134	1168	1069	712	465	1080
Aux lane	763	1263	1456	1691	1986	2134	

NOTES

1. The merge value of 1134 in lane 2 is below 1650 for PHF of 0.91=> **BETTER LOS D**
2. The weaving value of 1080 is less than 1650 for 0.91 PHF=> BETTER THAN **LOS D**
3. The total freeway volume of 4852 is less than 4900 for 6-lane freeway at any PHF=>Better than LOS D

Percentages for 2500 feet weaving section

ON RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2		38%	62%	49%	33%	23%
Aux lane	100%	62%	23%	9%	3%	

OFF RAMP PERCENTAGES

Traffic Volume Distribution (vehicles per hour)

Distance	0'	500'	1000'	1500'	2000'	2500'
Lane 1						
Lane 2	46%	26%	19%	19%	8%	
Aux lane		37%	60%	76%	92%	100%