APPENDIX P

2007 Existing Weave Analysis

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TC
Agency/Company	McMahon
Date Performed	
Analysis Time Period	AM Peak Hour

Site Information

Freeway/Dir of Travel	Rt 128 NB
Weaving Seg Location	Rt 128 NB @ Rt 9
Jurisdiction	
Analysis Year	Existing (2007)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	55	Weaving type	A
Weaving number of lanes, N	4	Volume ratio, VR	0.16
Weaving seg length, L (ft)	490	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}	7431	0.92	3	0	1.5	1.2	0.985	1.00	8198
V_{o2}	0	0.92	3	0	1.5	1.2	0.985	1.00	0
V_{w1}	936	0.92	3	0	1.5	1.2	0.985	1.00	1032
V_{w2}	475	0.92	3	0	1.5	1.2	0.985	1.00	524
V_w				1556	V_{nw}				8198
V									9754

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.15	0.0035		
b (Exhibit 24-6)	2.20	4.00		
c (Exhibit 24-6)	0.97	1.30		
d (Exhibit 24-6)	0.80	0.75		
Weaving intensity factor, Wi	2.82	1.54		
Weaving and non-weaving speeds, Si (mi/h)	26.77	32.73		

Number of lanes required for unconstrained operation, Nw 1.05
Maximum number of lanes, Nw (max) 1.40

☑ 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)	31.61
Weaving segment density, D (pc/mi/ln)	77.14
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6426
Capacity as a 15-minute flow rate, c (veh/h)	6331
Capacity as a full-hour volume, c_h (veh/h)	5825

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.

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TC
Agency/Company	McMahon
Date Performed	
Analysis Time Period	AM Peak Hour

Site Information

Freeway/Dir of Travel	Rt 128 SB
Weaving Seg Location	Rt 128 SB at Rt 9
Jurisdiction	
Analysis Year	Existing (2007)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	55
Weaving number of lanes, N	5
Weaving seg length, L (ft)	590
Terrain	Level
Weaving type	A
Volume ratio, VR	0.19
Weaving ratio, R	0.35

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
V_{o1}	5808	0.92	3	0	1.5	1.2	0.985	1.00	6407
V_{o2}	0	0.92	0	0	1.5	1.2	1.000	1.00	0
V_{w1}	857	0.92	3	0	1.5	1.2	0.985	1.00	945
V_{w2}	469	0.92	3	0	1.5	1.2	0.985	1.00	517
V_w				1462	V_{nw}				6407
V									7869

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.15	0.0035		
b (Exhibit 24-6)	2.20	4.00		
c (Exhibit 24-6)	0.97	1.30		
d (Exhibit 24-6)	0.80	0.75		
Weaving intensity factor, Wi	1.67	0.83		
Weaving and non-weaving speeds, Si (mi/h)	31.84	39.62		

Number of lanes required for unconstrained operation, Nw 1.38
Maximum number of lanes, Nw (max) 1.40

☑ 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)	37.90
Weaving segment density, D (pc/mi/ln)	41.53
Level of service, LOS	E
Capacity of base condition, c_b (pc/h)	8187
Capacity as a 15-minute flow rate, c (veh/h)	8066
Capacity as a full-hour volume, c_h (veh/h)	7421

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.

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TC
Agency/Company	McMahon
Date Performed	
Analysis Time Period	PM Peak Hour

Site Information

Freeway/Dir of Travel	Rt 128 NB
Weaving Seg Location	Rt 128 NB @ Rt 9
Jurisdiction	
Analysis Year	Existing (2007)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	55	Weaving type	A
Weaving number of lanes, N	4	Volume ratio, VR	0.17
Weaving seg length, L (ft)	490	Weaving ratio, R	0.48
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}	6800	0.92	3	0	1.5	1.2	0.985	1.00	7502
V_{o2}	0	0.92	3	0	1.5	1.2	0.985	1.00	0
V_{w1}	661	0.92	3	0	1.5	1.2	0.985	1.00	729
V_{w2}	706	0.92	3	0	1.5	1.2	0.985	1.00	778
V_w				1507	V_{nw}				7502
V									9009

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.15	0.0035		
b (Exhibit 24-6)	2.20	4.00		
c (Exhibit 24-6)	0.97	1.30		
d (Exhibit 24-6)	0.80	0.75		
Weaving intensity factor, Wi	2.65	1.42		
Weaving and non-weaving speeds, Si (mi/h)	27.32	33.56		

Number of lanes required for unconstrained operation, Nw 1.07
Maximum number of lanes, Nw (max) 1.40

☑ 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)	32.33
Weaving segment density, D (pc/mi/ln)	69.67
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	6382
Capacity as a 15-minute flow rate, c (veh/h)	6288
Capacity as a full-hour volume, c_h (veh/h)	5785

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.

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TC
Agency/Company	McMahon
Date Performed	
Analysis Time Period	PM Peak Hour

Site Information

Freeway/Dir of Travel	Rt 128 SB
Weaving Seg Location	Rt 128 SB at Rt 9
Jurisdiction	
Analysis Year	Existing (2007)

Inputs

Freeway free-flow speed, S_{FF} (mi/h)	55	Weaving type	A
Weaving number of lanes, N	5	Volume ratio, VR	0.16
Weaving seg length, L (ft)	590	Weaving ratio, R	0.44
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}	6746	0.92	3	0	1.5	1.2	0.985	1.00	7442
V_{o2}	0	0.92	0	0	1.5	1.2	1.000	1.00	0
V_{w1}	730	0.92	3	0	1.5	1.2	0.985	1.00	805
V_{w2}	570	0.92	3	0	1.5	1.2	0.985	1.00	628
V_w				1433	V_{nw}				7442
V									8875

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.15	0.0035		
b (Exhibit 24-6)	2.20	4.00		
c (Exhibit 24-6)	0.97	1.30		
d (Exhibit 24-6)	0.80	0.75		
Weaving intensity factor, Wi	1.80	0.89		
Weaving and non-weaving speeds, Si (mi/h)	31.10	38.80		

Number of lanes required for unconstrained operation, Nw 1.29
Maximum number of lanes, Nw (max) 1.40

☑ 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)	37.31
Weaving segment density, D (pc/mi/ln)	47.58
Level of service, LOS	F
Capacity of base condition, c_b (pc/h)	8316
Capacity as a 15-minute flow rate, c (veh/h)	8193
Capacity as a full-hour volume, c_h (veh/h)	7538

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.