

Appendix L Traffic

L1: Orange County Traffic Tables

Table O-2
Existing (2009) I-405 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Existing Condition (2009)					
			AM Peak Hour			PM Peak Hour		
			v/c	Density ^{1,3}	LOS ²	v/c	Density ^{1,3}	LOS ²
Bristol Street to Fairview Road	GP	NB	0.89	27.1	D	0.88	*	F
		SB	1.13	42.4	F	0.87	26.5	D
	HOV	NB	0.53	13.5	B	0.79	36.4	E
		SB	0.67	17.7	B	0.81	20.8	C
Fairview Road to Harbor Boulevard/Hyland Avenue	GP	NB	0.81	24.6	D	0.78	*	F
		SB	1.02	35.2	F	0.81	24.7	C
	HOV	NB	0.52	13.1	B	0.93	46.4	F
		SB	0.64	17.4	B	0.73	19.2	C
Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue	GP	NB	0.86	26.3	D	0.89	*	F
		SB	1.09	38.4	F	0.89	27.6	D
	HOV	NB	0.53	13.5	B	0.94	40.8	E
		SB	0.67	17.6	B	0.78	20.6	C
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	0.87	26.7	D	0.93	*	F
		SB	1.16	43.9	F	0.95	29.6	D
	HOV	NB	0.58	15.6	B	0.95	36.3	E
		SB	0.81	27.1	D	0.82	27.8	D
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	1.08	38.5	F	1.14	*	F
		SB	1.24	*	F	1.10	39.5	F
	HOV	NB	0.68	20.0	C	1.03	36.2	F
		SB	0.88	26.4	D	0.88	25.4	C
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	1.14	*	F	1.15	42.9	F
		SB	1.07	37.9	F	1.16	42.0	F
	HOV	NB	0.85	28.2	D	0.94	25.4	C

Table O-2
Existing (2009) I-405 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Existing Condition (2009)					
			AM Peak Hour			PM Peak Hour		
			v/c	Density ^{1,3}	LOS ²	v/c	Density ^{1,3}	LOS ²
		SB	0.72	19.8	C	0.98	30.6	D
Beach Boulevard/Edinger Avenue to Goldenwest Street/Bolsa Avenue	GP	NB	1.08	*	F	1.09	*	F
		SB	0.96	*	F	1.13	*	F
	HOV	NB	0.85	24.3	C	1.02	36.7	F
		SB	0.81	26.1	D	0.92	36.0	E
Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Boulevard	GP	NB	1.08	37.2	F	1.10	37.0	F
		SB	1.00	*	F	1.09	39.5	F
	HOV	NB	0.93	25.2	C	1.08	30.9	F
		SB	0.79	23.4	C	0.97	27.1	D
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	1.14	*	F	1.13	42.0	F
		SB	1.00	*	F	1.07	38.6	F
	HOV	NB	0.89	25.3	C	1.01	29.8	F
		SB	0.75	21.8	C	0.99	29.1	D
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	1.13	*	F	1.06	*	F
		SB	1.08	39.7	F	1.16	*	F
	HOV	NB	0.94	27.7	D	1.01	32.5	F
		SB	0.74	19.7	C	0.99	29.1	D
Seal Beach Boulevard to I-605	GP	NB	1.13	43.8	F	1.05	35.2	F
		SB	1.10	*	F	1.15	*	F
	HOV	NB	0.84	23.0	C	0.87	24.0	C
		SB	0.67	28.2	D	1.05	52.7	F
I-605 to San Gabriel River	GP	NB	0.98	*	F	0.81	24.7	C
		SB	0.87	26.4	D	0.85	*	F
	HOV	NB	0.84	30.0	D	0.87	32.7	D

Table O-2
Existing (2009) I-405 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Existing Condition (2009)					
			AM Peak Hour			PM Peak Hour		
			v/c	Density ^{1,3}	LOS ²	v/c	Density ^{1,3}	LOS ²
SR-73 - Bear Street to I-405	GP	SB	0.50	14.6	B	0.95	37.1	E
		NB	0.56	16.8	B	0.66	18.7	C
		SB	0.56	17.0	B	0.47	14.3	B
I-605 - I-405 to Katella Avenue	GP	NB	0.68	20.4	C	0.71	21.4	C
		SB	0.85	*	F	0.79	*	F

Notes:

1. Density is shown in passenger cars/mile/lane (pc/mi/ln).
2. Level of Service (LOS): General Purpose (GP) lane and High Occupancy Vehicle (HOV) lane LOS is based on density except when volume-to-capacity (v/c) ratio is greater than or equal to 1.0, which is LOS F.
3. * Existing Condition (Year 2009): Low measured freeway speeds resulting in LOS F conditions, as illustrated in PeMS data.

Source: Albert Grover & Associates, 2011

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Table O-7 Years 2020 and 2040 No Build Alternative I-405 Mainline Peak Hour Level of Service														
Location	Lane Type	Direction	Year 2020 No Build						Year 2040 No Build					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
Bristol Street to Fairview Road	GP	NB	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.07	34.4	F	1.55	*	F	1.20	44.2	F
	HOV	NB	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.08	34.4	F	1.55	*	F	1.20	44.2	F
Fairview Road to Harbor Boulevard/Hyland Avenue	GP	NB	0.99	30.2	D	1.09	35.6	F	1.13	38.0	F	1.28	*	F
		SB	1.30	*	F	1.04	32.4	F	1.50	*	F	1.16	40.6	F
	HOV	NB	0.99	30.2	D	1.10	35.6	F	1.13	38.0	F	1.28	*	F
		SB	1.30	*	F	1.04	32.4	F	1.50	*	F	1.16	40.6	F
Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue	GP	NB	1.07	34.4	F	1.21	*	F	1.23	*	F	1.41	*	F
		SB	1.40	*	F	1.13	38.3	F	1.63	*	F	1.28	*	F
	HOV	NB	1.07	34.4	F	1.21	*	F	1.23	*	F	1.41	*	F
		SB	1.40	*	F	1.13	38.3	F	1.63	*	F	1.28	*	F
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	1.14	38.4	F	1.29	*	F	1.31	*	F	1.49	*	F
		SB	1.48	*	F	1.18	42.2	F	1.73	*	F	1.33	*	F
	HOV	NB	1.14	38.4	F	1.29	*	F	1.31	*	F	1.49	*	F
		SB	1.48	*	F	1.18	42.2	F	1.73	*	F	1.33	*	F
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	1.35	*	F	1.53	*	F	1.57	*	F	1.76	*	F
		SB	1.61	*	F	1.36	*	F	1.89	*	F	1.54	*	F
	HOV	NB	1.35	*	F	1.53	*	F	1.57	*	F	1.76	*	F
		SB	1.61	*	F	1.36	*	F	1.89	*	F	1.54	*	F
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	1.42	*	F	1.52	*	F	1.64	*	F	1.75	*	F
		SB	1.46	*	F	1.43	*	F	1.75	*	F	1.61	*	F
	HOV	NB	1.42	*	F	1.52	*	F	1.64	*	F	1.75	*	F
		SB	1.46	*	F	1.43	*	F	1.75	*	F	1.61	*	F
Beach Boulevard/Edinger Avenue to Goldenwest Street/Bolsa Avenue	GP	NB	1.37	*	F	1.46	*	F	1.59	*	F	1.67	*	F
		SB	1.37	*	F	1.41	*	F	1.68	*	F	1.59	*	F
	HOV	NB	1.37	*	F	1.46	*	F	1.59	*	F	1.67	*	F
		SB	1.37	*	F	1.41	*	F	1.68	*	F	1.59	*	F
Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Boulevard	GP	NB	1.37	*	F	1.47	*	F	1.59	*	F	1.68	*	F
		SB	1.39	*	F	1.38	*	F	1.69	*	F	1.56	*	F
	HOV	NB	1.37	*	F	1.47	*	F	1.59	*	F	1.68	*	F
		SB	1.39	*	F	1.38	*	F	1.69	*	F	1.56	*	F
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	1.39	*	F	1.47	*	F	1.61	*	F	1.68	*	F
		SB	1.37	*	F	1.35	*	F	1.67	*	F	1.53	*	F

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Table O-7
Years 2020 and 2040 No Build Alternative I-405 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Year 2020 No Build						Year 2040 No Build					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
	HOV	NB	1.39	*	F	1.47	*	F	1.61	*	F	1.68	*	F
		SB	1.37	*	F	1.35	*	F	1.68	*	F	1.53	*	F
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	1.30	*	F	1.30	*	F	1.50	*	F	1.52	*	F
		SB	1.31	*	F	1.29	*	F	1.57	*	F	1.46	*	F
	HOV	NB	1.16	*	F	1.16	*	F	1.36	*	F	1.37	*	F
		SB	1.17	*	F	1.15	*	F	1.43	*	F	1.32	*	F
Seal Beach Boulevard to I-605	GP	NB	1.31	*	F	1.29	*	F	1.51	*	F	1.51	*	F
		SB	1.31	*	F	1.30	*	F	1.57	*	F	1.47	*	F
	HOV	NB	1.16	*	F	1.15	*	F	1.36	*	F	1.37	*	F
		SB	1.17	*	F	1.15	*	F	1.43	*	F	1.33	*	F
I-605 to San Gabriel River	GP	NB	1.29	*	F	1.07	34.5	F	1.50	*	F	1.20	45.0	F
		SB	1.17	41.7	F	1.20	44.4	F	1.43	*	F	1.41	*	F
	HOV	NB	1.29	*	F	1.07	34.5	F	1.50	*	F	1.20	45.0	F
		SB	1.17	41.7	F	1.20	44.4	F	1.43	*	F	1.41	*	F
SR-73 - Bear Street to I-405	GP	NB	0.62	18.1	C	0.81	23.9	C	0.66	19.3	C	0.90	27.0	C
		SB	0.77	22.6	C	0.58	17.1	B	0.90	26.9	D	0.65	19.2	C
I-605 - I-405 to Katella Avenue	GP	NB	0.69	19.8	C	0.84	24.2	C	0.78	22.5	C	1.01	30.9	F
		SB	0.93	28.1	D	0.79	23.3	C	1.10	36.2	F	0.92	27.7	D

Notes:

- Density is shown in passenger cars/mile/lane (pc/mi/ln).
- Level of Service (LOS): General Purpose (GP) lane and High Occupancy Vehicle (HOV) lane LOS is based on density except when volume-to-capacity (v/c) ratio is greater than or equal to 1.0, which is LOS F.
- * Future Condition (Years 2020 and 2040): Density is in excess of 45 pc/mi/ln; therefore LOS is F.

Source: Albert Grover & Associates, 2011

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Table O-11
Years 2020 and 2040 Alternative 1 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Year 2020 No Build						Year 2020 Alternative 1						Year 2040 No Build						Year 2040 Alternative 1					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
Bristol Street to Fairview Road	GP	NB	1.05	33.2	F	1.12	37.0	F	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.07	34.4	F	1.35	*	F	1.07	34.4	F	1.55	*	F	1.20	44.2	F	1.55	*	F	1.20	44.2	F
	HOV	NB	1.05	33.2	F	1.12	37.0	F	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.08	34.4	F	1.35	*	F	1.08	34.4	F	1.55	*	F	1.20	44.2	F	1.55	*	F	1.20	44.2	F
Fairview Road to Harbor Boulevard/Hyl and Avenue	GP	NB	0.99	30.2	D	1.09	35.6	F	0.99	30.2	D	1.09	35.6	F	1.13	38.0	F	1.28	*	F	1.13	38.0	F	1.28	*	F
		SB	1.30	*	F	1.04	32.4	F	1.30	*	F	1.04	32.4	F	1.50	*	F	1.16	40.6	F	1.50	*	F	1.16	40.6	F
	HOV	NB	0.99	30.2	D	1.10	35.6	F	0.99	30.2	D	1.10	35.6	F	1.13	38.0	F	1.28	*	F	1.13	38.0	F	1.28	*	F
		SB	1.30	*	F	1.04	32.4	F	1.30	*	F	1.04	32.4	F	1.50	*	F	1.16	40.6	F	1.50	*	F	1.16	40.6	F
Harbor Boulevard/Hyl and Avenue to Euclid Street/Ellis Avenue	GP	NB	1.07	34.4	F	1.21	*	F	1.07	34.4	F	1.21	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	*	F
		SB	1.40	*	F	1.13	38.3	F	1.40	*	F	1.13	38.3	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	*	F
	HOV	NB	1.07	34.4	F	1.21	*	F	1.07	34.4	F	1.21	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	*	F
		SB	1.40	*	F	1.13	38.3	F	1.40	*	F	1.13	38.3	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	*	F
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	1.14	38.4	F	1.29	*	F	0.97	29.4	D	1.10	36.2	F	1.31	*	F	1.49	*	F	1.12	37.5	F	1.28	*	F
		SB	1.48	*	F	1.18	42.2	F	1.27	*	F	1.01	31.2	F	1.73	*	F	1.33	*	F	1.48	*	F	1.14	38.6	F
	HOV	NB	1.14	38.4	F	1.29	*	F	0.97	29.4	D	1.10	36.2	F	1.31	*	F	1.49	*	F	1.12	37.5	F	1.28	*	F
		SB	1.48	*	F	1.18	42.2	F	1.27	*	F	1.01	31.2	F	1.73	*	F	1.33	*	F	1.48	*	F	1.14	38.6	F
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	1.35	*	F	1.53	*	F	1.13	37.9	F	1.27	*	F	1.57	*	F	1.76	*	F	1.31	*	F	1.47	*	F
		SB	1.61	*	F	1.36	*	F	1.34	*	F	1.14	38.4	F	1.89	*	F	1.54	*	F	1.57	*	F	1.28	*	F
	HOV	NB	1.35	*	F	1.53	*	F	1.13	37.9	F	1.27	*	F	1.57	*	F	1.76	*	F	1.31	*	F	1.47	*	F
		SB	1.61	*	F	1.36	*	F	1.34	*	F	1.14	38.4	F	1.89	*	F	1.54	*	F	1.57	*	F	1.28	*	F
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	1.42	*	F	1.52	*	F	1.19	42.6	F	1.27	*	F	1.64	*	F	1.75	*	F	1.37	*	F	1.45	*	F
		SB	1.46	*	F	1.43	*	F	1.21	*	F	1.19	43.0	F	1.75	*	F	1.61	*	F	1.46	*	F	1.34	*	F
	HOV	NB	1.42	*	F	1.52	*	F	1.19	42.6	F	1.27	*	F	1.64	*	F	1.75	*	F	1.37	*	F	1.46	*	F
		SB	1.46	*	F	1.43	*	F	1.21	*	F	1.19	43.0	F	1.75	*	F	1.61	*	F	1.46	*	F	1.34	*	F
Beach Boulevard/Edinger Avenue to Goldenwest Street/Bolsa Avenue	GP	NB	1.37	*	F	1.46	*	F	1.14	39.0	F	1.21	*	F	1.59	*	F	1.67	*	F	1.33	*	F	1.39	*	F
		SB	1.37	*	F	1.41	*	F	1.14	39.0	F	1.18	41.6	F	1.68	*	F	1.59	*	F	1.40	*	F	1.33	*	F
	HOV	NB	1.37	*	F	1.46	*	F	1.14	39.0	F	1.05	*	F	1.59	*	F	1.67	*	F	1.33	*	F	1.39	*	F
		SB	1.37	*	F	1.41	*	F	1.14	39.0	F	1.18	41.6	F	1.68	*	F	1.59	*	F	1.40	*	F	1.33	*	F
Goldenwest Street/Bolsa	GP	NB	1.37	*	F	1.47	*	F	1.14	38.7	F	1.22	*	F	1.59	*	F	1.68	*	F	1.32	*	F	1.40	*	F
		SB	1.39	*	F	1.38	*	F	1.16	39.9	F	1.15	39.6	F	1.69	*	F	1.56	*	F	1.41	*	F	1.30	*	F

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Table O-11
Years 2020 and 2040 Alternative 1 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Year 2020 No Build						Year 2020 Alternative 1						Year 2040 No Build						Year 2040 Alternative 1					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
Avenue to Springdale Street/Westminster Boulevard	HOV	NB	1.37	*	F	1.47	*	F	1.14	38.7	F	1.22	*	F	1.59	*	F	1.68	*	F	1.32	*	F	1.40	*	F
		SB	1.39	*	F	1.38	*	F	1.16	39.9	F	1.15	39.6	F	1.69	*	F	1.56	*	F	1.41	*	F	1.30	*	F
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	1.39	*	F	1.47	*	F	1.16	40.3	F	1.22	*	F	1.61	*	F	1.68	*	F	1.34	*	F	1.40	*	F
		SB	1.37	*	F	1.35	*	F	1.14	39.0	F	1.13	37.6	F	1.67	*	F	1.53	*	F	1.40	*	F	1.27	*	F
	HOV	NB	1.39	*	F	1.47	*	F	1.16	40.3	F	1.22	*	F	1.61	*	F	1.68	*	F	1.34	*	F	1.40	*	F
		SB	1.37	*	F	1.35	*	F	1.14	39.0	F	1.13	37.6	F	1.68	*	F	1.53	*	F	1.40	*	F	1.27	*	F
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	1.30	*	F	1.30	*	F	1.14	38.8	F	1.14	38.7	F	1.50	*	F	1.52	*	F	1.32	*	F	1.33	*	F
		SB	1.31	*	F	1.29	*	F	1.15	39.4	F	1.13	38.0	F	1.57	*	F	1.46	*	F	1.38	*	F	1.28	*	F
	HOV	NB	1.16	*	F	1.16	*	F	1.07	38.8	F	1.07	38.7	F	1.36	*	F	1.37	*	F	1.25	*	F	1.26	*	F
		SB	1.17	*	F	1.15	*	F	1.08	39.4	F	1.06	38.0	F	1.43	*	F	1.32	*	F	1.31	*	F	1.21	*	F
Seal Beach Boulevard to I-605	GP	NB	1.31	*	F	1.29	*	F	1.14	39.0	F	1.13	38.3	F	1.51	*	F	1.51	*	F	1.32	*	F	1.33	*	F
		SB	1.31	*	F	1.30	*	F	1.15	39.4	F	1.13	38.3	F	1.57	*	F	1.47	*	F	1.38	*	F	1.29	*	F
	HOV	NB	1.16	*	F	1.15	*	F	1.07	39.0	F	1.06	38.3	F	1.36	*	F	1.37	*	F	1.25	*	F	1.26	*	F
		SB	1.17	*	F	1.15	*	F	1.08	39.4	F	1.07	38.3	F	1.43	*	F	1.33	*	F	1.31	*	F	1.22	*	F
I-605 to San Gabriel River	GP	NB	1.29	*	F	1.07	34.5	F							1.50	*	F	1.20	45.0	F						
		SB	1.17	41.7	F	1.20	44.4	F							1.43	*	F	1.41	*	F						
	HOV	NB	1.29	*	F	1.07	34.5	F							1.50	*	F	1.20	45.0	F						
		SB	1.17	41.7	F	1.20	44.4	F							1.43	*	F	1.41	*	F						
SR-73 - Bear Street to I-405	GP	NB	0.62	18.1	C	0.81	23.9	C							0.66	19.3	C	0.90	27.0	C						
		SB	0.77	22.6	C	0.58	17.1	B							0.90	26.9	D	0.65	19.2	C						
I-605 - I-405 to Katella Avenue	GP	NB	0.69	19.8	C	0.84	24.2	C							0.78	22.5	C	1.01	30.9	F						
		SB	0.93	28.1	D	0.79	23.3	C							1.10	36.2	F	0.92	27.7	D						

Notes:
 1. Density is shown in passenger cars/mile/lane (pc/mi/ln).
 2. Level of Service (LOS): General Purpose (GP) lane and High Occupancy Vehicle (HOV) lane LOS is based on density except when volume-to-capacity (v/c) ratio is greater than or equal to 1.0, which is LOS F.
 3. * Existing Condition (Year 2009): Low measured freeway speeds resulting in LOS F conditions, as illustrated in PeMS data.
 * Future Conditions (Years 2020 and 2040): Density is in excess of 45 pc/mi/ln; therefore LOS is F.
 Source: Albert Grover & Associates, 2011

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Table O-12 Years 2020 and 2040 Alternative 1 I-405 Ramp Junction Peak Hour Level of Service												
Interchange	Ramp Type	Year 2020 Alternative 1						Year 2040 Alternative 1				
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour	
		Ramp d/c	Ramp Junction		Ramp d/c	Ramp Junction		Ramp d/c	Ramp Junction		Ramp d/c	Ramp Junction
	Density ¹	LOS ^{2,3}		Density ¹	LOS ^{2,3}		Density ¹	LOS ^{2,3}		Density ¹	LOS ^{2,3}	

3. LOS F under two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway segment; (2) if low measured freeway speeds and service capacity, which is denoted with an asterik (*) in the density column. In both cases, the density is not applicable.

4. ** Per Highway Capacity Manual, density was not calculated for area exceeding 1,500 ft in length.

5. As the 3 lanes on WB SR-22 are reduced to 2 lanes at I-405 connection, 2.5 lanes are assumed for increased capacity due to forced flow conditions.

Source: Albert & Grover Associates, 2011

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Freeway Mainline Weaving Segment	Year 2020 Alternative 1				Year 2040 Alternative 1			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
I-405 - Seal Beach Boulevard to SR-22 Westbound	32.9	D	38.0	E	37.0	E	45.4	F
I-405 Southbound - SR-22 Eastbound to Seal Beach Boulevard	31.0	D	36.9	E	36.2	E	40.7	E
I-405 Southbound - Harbor Boulevard to Fairview Road	43.9	F	28.5	D	49.1	F	31.4	D

Notes:

1. Density is shown in passenger cars/mile/lane (pc/mi/ln).
2. Level of Service (LOS) is based on density (pc/mi/ln). The density LOS thresholds for weaving sections are shown in Table 3.1.6-3.

Source: Albert Grover & Associates, 2011

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Table O-15
Years 2020 and 2040 Alternative 2 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Year 2020 No Build						Year 2020 Alternative 2						Year 2040 No Build						Year 2040 Alternative 2					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
Bristol Street to Fairview Road	GP	NB	1.05	33.2	F	1.12	37.0	F	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.07	34.4	F	1.35	*	F	1.07	34.4	F	1.55	*	F	1.20	44.2	F	1.55	*	F	1.20	44.2	F
	HOV	NB	1.05	33.2	F	1.12	37.0	F	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.08	34.4	F	1.35	*	F	1.08	34.4	F	1.55	*	F	1.20	44.2	F	1.55	*	F	1.20	44.2	F
Fairview Road to Harbor Boulevard/Hyland Avenue	GP	NB	0.99	30.2	D	1.09	35.6	F	0.99	30.2	D	1.09	35.6	F	1.13	38.0	F	1.28	*	F	1.13	38.0	F	1.28	*	F
		SB	1.30	*	F	1.04	32.4	F	1.30	*	F	1.04	32.4	F	1.50	*	F	1.16	40.6	F	1.50	*	F	1.16	40.6	F
	HOV	NB	0.99	30.2	D	1.10	35.6	F	0.99	30.2	D	1.10	35.6	F	1.13	38.0	F	1.28	*	F	1.13	38.0	F	1.28	*	F
		SB	1.30	*	F	1.04	32.4	F	1.30	*	F	1.04	32.4	F	1.50	*	F	1.16	40.6	F	1.50	*	F	1.16	40.6	F
Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue	GP	NB	1.07	34.4	F	1.21	*	F	1.07	34.4	F	1.21	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	*	F
		SB	1.40	*	F	1.13	38.3	F	1.40	*	F	1.13	38.3	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	*	F
	HOV	NB	1.07	34.4	F	1.21	*	F	1.07	34.4	F	1.21	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	*	F
		SB	1.40	*	F	1.13	38.3	F	1.40	*	F	1.13	38.3	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	*	F
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	1.14	38.4	F	1.29	*	F	0.97	29.4	D	1.10	36.2	F	1.31	*	F	1.49	*	F	1.12	37.5	F	1.28	*	F
		SB	1.48	*	F	1.18	42.2	F	1.27	*	F	1.01	31.2	F	1.73	*	F	1.33	*	F	1.48	*	F	1.14	38.6	F
	HOV	NB	1.14	38.4	F	1.29	*	F	0.97	29.4	D	1.10	36.2	F	1.31	*	F	1.49	*	F	1.12	37.5	F	1.28	*	F
		SB	1.48	*	F	1.18	42.2	F	1.27	*	F	1.01	31.2	F	1.73	*	F	1.33	*	F	1.48	*	F	1.14	38.6	F
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	1.35	*	F	1.53	*	F	0.97	29.1	D	1.09	35.3	F	1.57	*	F	1.76	*	F	1.12	37.4	F	1.26	*	F
		SB	1.61	*	F	1.36	*	F	1.15	39.2	F	0.97	29.4	D	1.89	*	F	1.54	*	F	1.35	*	F	1.10	35.8	F
	HOV	NB	1.35	*	F	1.53	*	F	0.97	29.1	D	1.09	35.3	F	1.57	*	F	1.76	*	F	1.12	37.4	F	1.26	*	F
		SB	1.61	*	F	1.36	*	F	1.15	39.2	F	0.97	29.4	D	1.89	*	F	1.54	*	F	1.35	*	F	1.10	35.8	F
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	1.42	*	F	1.52	*	F	1.02	31.4	F	1.09	35.2	F	1.64	*	F	1.75	*	F	1.17	41.4	F	1.25	*	F
		SB	1.46	*	F	1.43	*	F	1.04	32.5	F	1.02	31.6	F	1.75	*	F	1.61	*	F	1.25	*	F	1.15	39.2	F
	HOV	NB	1.42	*	F	1.52	*	F	1.02	31.4	F	1.09	35.2	F	1.64	*	F	1.75	*	F	1.17	41.4	F	1.25	*	F
		SB	1.46	*	F	1.43	*	F	1.04	32.5	F	1.02	31.6	F	1.75	*	F	1.61	*	F	1.25	*	F	1.15	39.2	F
Beach Boulevard/Edinger Avenue to Goldenwest	GP	NB	1.37	*	F	1.46	*	F	0.98	29.7	D	1.04	32.5	F	1.59	*	F	1.67	*	F	1.14	38.5	F	1.19	42.9	F
		SB	1.37	*	F	1.41	*	F	0.98	29.6	D	1.01	30.9	F	1.68	*	F	1.59	*	F	1.20	43.5	F	1.14	38.4	F
	HOV	NB	1.37	*	F	1.46	*	F	0.98	29.7	D	1.04	32.5	F	1.59	*	F	1.67	*	F	1.14	38.5	F	1.19	42.9	F
		SB	1.37	*	F	1.41	*	F	0.98	29.6	D	1.01	30.9	F	1.68	*	F	1.59	*	F	1.20	43.5	F	1.14	38.4	F

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Table O-15
Years 2020 and 2040 Alternative 2 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Year 2020 No Build						Year 2020 Alternative 2						Year 2040 No Build						Year 2040 Alternative 2					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
Street/Bols a Avenue																										
Goldenwest Street/Bols a Avenue to Springdale Street/Westminster Boulevard	GP	NB	1.37	*	F	1.47	*	F	0.98	29.5	D	1.05	33.0	F	1.59	*	F	1.68	*	F	1.13	38.3	F	1.20	43.9	F
		SB	1.39	*	F	1.38	*	F	0.99	30.1	D	0.99	30.0	D	1.69	*	F	1.56	*	F	1.21	44.5	F	1.12	37.0	F
	HOV	NB	1.37	*	F	1.47	*	F	0.98	29.5	D	1.05	33.0	F	1.59	*	F	1.68	*	F	1.13	38.3	F	1.20	43.9	F
		SB	1.39	*	F	1.38	*	F	0.99	30.1	D	0.99	30.0	D	1.69	*	F	1.56	*	F	1.21	44.5	F	1.12	37.0	F
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	1.39	*	F	1.47	*	F	0.99	30.3	D	1.05	32.9	F	1.61	*	F	1.68	*	F	1.15	39.6	F	1.20	43.6	F
		SB	1.37	*	F	1.35	*	F	0.98	29.7	D	0.96	29.0	D	1.67	*	F	1.53	*	F	1.20	43.4	F	1.09	35.4	F
	HOV	NB	1.39	*	F	1.47	*	F	0.99	30.3	D	1.05	32.9	F	1.61	*	F	1.68	*	F	1.15	39.6	F	1.20	43.6	F
		SB	1.37	*	F	1.35	*	F	0.98	29.7	D	0.96	29.0	D	1.68	*	F	1.53	*	F	1.20	43.4	F	1.09	35.4	F
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	1.30	*	F	1.30	*	F	1.03	31.8	F	1.03	31.7	F	1.50	*	F	1.52	*	F	1.19	42.5	F	1.20	43.6	F
		SB	1.31	*	F	1.29	*	F	1.03	32.2	F	1.02	31.3	F	1.57	*	F	1.46	*	F	1.24	*	F	1.15	39.6	F
	HOV	NB	1.16	*	F	1.16	*	F	0.96	31.8	D	0.96	31.7	D	1.36	*	F	1.37	*	F	1.12	42.5	F	1.13	43.6	F
		SB	1.17	*	F	1.15	*	F	0.97	32.2	D	0.95	31.3	D	1.43	*	F	1.32	*	F	1.17	*	F	1.08	39.6	F
Seal Beach Boulevard to I-605	GP	NB	1.31	*	F	1.29	*	F	1.03	31.9	F	1.02	31.5	F	1.51	*	F	1.51	*	F	1.19	42.8	F	1.19	43.2	F
		SB	1.31	*	F	1.30	*	F	1.15	39.4	F	1.13	38.3	F	1.57	*	F	1.47	*	F	1.38	*	F	1.29	*	F
	HOV	NB	1.16	*	F	1.15	*	F	0.96	31.9	D	0.95	31.5	D	1.36	*	F	1.37	*	F	1.12	42.8	F	1.13	43.2	F
		SB	1.17	*	F	1.15	*	F	1.08	39.4	F	1.07	38.3	F	1.43	*	F	1.33	*	F	1.31	*	F	1.22	*	F
I-605 to San Gabriel River	GP	NB	1.29	*	F	1.07	34.5	F							1.50	*	F	1.20	45.0	F						
		SB	1.17	41.7	F	1.20	44.4	F							1.43	*	F	1.41	*	F						
	HOV	NB	1.29	*	F	1.07	34.5	F							1.50	*	F	1.20	45.0	F						
		SB	1.17	41.7	F	1.20	44.4	F							1.43	*	F	1.41	*	F						
SR-73 - Bear Street to I-405	GP	NB	0.62	18.1	C	0.81	23.9	C							0.66	19.3	C	0.90	27.0	C						
		SB	0.77	22.6	C	0.58	17.1	B							0.90	26.9	D	0.65	19.2	C						
I-605 - I-405 to Katella Avenue	GP	NB	0.69	19.8	C	0.84	24.2	C							0.78	22.5	C	1.01	30.9	F						
		SB	0.93	28.1	D	0.79	23.3	C							1.10	36.2	F	0.92	27.7	D						

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Table O-15
Years 2020 and 2040 Alternative 2 Mainline Peak Hour Level of Service

Location	Lane Type	Direction	Year 2020 No Build						Year 2020 Alternative 2						Year 2040 No Build						Year 2040 Alternative 2					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²

Notes:

1. Density is shown in passenger cars/mile/lane (pc/mi/ln).
2. Level of Service (LOS): General Purpose (GP) lane and High Occupancy Vehicle (HOV) lane LOS is based on density except when volume-to-capacity (v/c) ratio is greater than or equal to 1.0, which is LOS F.
3. * Existing Condition (Year 2009): Low measured freeway speeds resulting in LOS F conditions, as illustrated in PeMS data.
* Future Conditions (Years 2020 and 2040): Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table O-19 Years 2020 and 2040 Alternative 3 Mainline Peak Hour Level of Service														
Location	Lane Type	Direction	Year 2020 Alternative 3						Year 2040 Alternative 3					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
Bristol Street to SR-73	GP	NB	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.07	34.4	F	1.55	*	F	1.20	44.2	F
	HOV	NB	1.05	33.2	F	1.12	37.0	F	1.20	43.6	F	1.28	*	F
		SB	1.35	*	F	1.08	34.4	F	1.55	*	F	1.20	44.2	F
SR-73 to Fairview Road (Express - HOV Transition)	GP	NB	0.92	27.7	D	0.94	28.6	D	1.11	36.9	F	1.16	41.3	F
		SB	1.23	*	F	0.97	29.3	D	1.46	*	F	1.11	36.7	F
	Express/HOV	NB	1.03	27.7	F	1.03	28.6	F	1.08	36.9	F	1.08	41.3	F
		SB	1.19	*	F	1.03	29.3	F	1.19	*	F	1.08	36.7	F
Fairview Road to Harbor Boulevard/Hyland Avenue	GP	NB	0.90	26.3	D	0.99	30.0	D	1.06	33.4	F	1.21	44.6	F
		SB	1.23	*	F	0.96	28.8	D	1.47	*	F	1.11	36.4	F
	Express	NB	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C
		SB	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C
Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue	GP	NB	0.99	30.2	D	1.13	37.8	F	1.17	41.2	F	1.35	*	F
		SB	1.34	*	F	1.06	33.7	F	1.61	*	F	1.23	*	F
	Express	NB	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C
		SB	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	0.88	25.5	C	1.00	30.5	D	1.05	33.0	F	1.20	43.8	F
		SB	1.20	43.3	F	0.92	27.2	D	1.44	*	F	1.07	33.9	F
	Express	NB	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C
		SB	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	1.04	32.5	F	1.18	41.9	F	1.26	*	F	1.42	*	F
		SB	1.26	*	F	1.05	33.0	F	1.54	*	F	1.22	*	F
	Express	NB	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C
		SB	0.86	24.6	C	0.78	22.3	C	0.86	24.6	C	0.78	22.3	C
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	1.12	37.4	F	1.20	43.6	F	1.34	*	F	1.42	*	F
		SB	1.13	38.2	F	1.11	36.7	F	1.43	*	F	1.29	*	F
	Express	NB	0.76	21.5	C	0.81	23.1	C	0.76	21.5	C	0.81	23.1	C
		SB	0.81	23.1	C	0.80	22.7	C	0.81	23.1	C	0.80	22.7	C
Beach Boulevard/Edinger Avenue to Goldenwest Street/Bolsa Avenue	GP	NB	1.07	34.2	F	1.13	38.1	F	1.29	*	F	1.34	*	F
		SB	1.05	32.9	F	1.09	35.5	F	1.35	*	F	1.27	*	F
	Express	NB	0.76	21.5	C	0.81	23.1	C	0.76	21.5	C	0.81	23.1	C
		SB	0.81	23.1	C	0.80	22.7	C	0.81	23.1	C	0.80	22.7	C
Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Boulevard	GP	NB	1.08	34.5	F	1.18	41.6	F	1.30	*	F	1.39	*	F
		SB	1.10	35.7	F	1.09	35.4	F	1.40	*	F	1.27	*	F
	Express	NB	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C

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Location	Lane Type	Direction	Year 2020 Alternative 3						Year 2040 Alternative 3					
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²
		SB	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	1.10	36.0	F	1.17	41.4	F	1.32	*	F	1.39	*	F
		SB	1.08	34.8	F	1.06	33.5	F	1.38	*	F	1.24	*	F
	Express	NB	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C
		SB	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C	0.73	20.8	C
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	1.18	42.3	F	1.18	42.2	F	1.41	*	F	1.43	*	F
		SB	1.20	43.3	F	1.17	41.2	F	1.49	*	F	1.36	*	F
	Express	NB	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D
		SB	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D
Seal Beach Boulevard to I-605	GP	NB	1.19	42.7	F	1.18	41.6	F	1.42	*	F	1.42	*	F
		SB	1.20	43.4	F	1.18	41.6	F	1.49	*	F	1.38	*	F
	Express	NB	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D
		SB	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D	0.92	26.2	D
I-605 to San Gabriel River	GP	NB	1.29	*	F	1.07	34.5	F	1.50	*	F	1.20	45.0	F
		SB	1.17	41.7	F	1.20	44.4	F	1.43	*	F	1.41	*	F
	HOV	NB	1.29	*	F	1.07	34.5	F	1.50	*	F	1.20	45.0	F
		SB	1.17	41.7	F	1.20	44.4	F	1.43	*	F	1.41	*	F
SR-73 - Bear Street to Fairview Road Ramp	GP	NB	0.62	18.1	C	0.81	23.9	C	0.66	19.3	C	0.90	27.0	D
		SB	0.77	22.6	C	0.58	17.1	B	0.90	26.9	D	0.65	19.2	C
SR-73 - Fairview Road Ramp to I-405	GP	NB	0.78	15.6	B	1.08	21.7	F	0.85	17.0	B	1.26	25.3	F
		SB	0.73	18.2	C	0.52	13.1	B	0.93	23.2	C	0.63	15.7	B
	Express	NB	0.59	16.9	B	0.76	21.5	C	0.59	16.9	B	0.76	21.5	C
		SB	0.76	21.5	C	0.65	18.5	C	0.76	21.5	C	0.65	18.5	C
I-605 - I-405 to Express/HOV Transition	GP	NB	0.69	19.9	C	0.86	25.0	C	0.80	23.1	C	1.06	33.8	F
		SB	0.92	27.6	D	0.76	22.4	C	1.10	36.7	F	0.92	27.7	D
	Express/ HOV	NB	0.84	19.9	C	0.92	25.0	C	0.89	23.1	C	0.97	33.8	D
		SB	0.81	27.6	D	0.76	22.4	C	0.86	36.7	E	0.76	27.7	D
I-605 - Express/HOV Transition to Katella Avenue	GP	NB	0.86	19.8	C	1.04	24.2	F	0.98	22.5	C	1.26	30.9	F
		SB	0.93	28.1	D	0.79	23.3	C	1.10	36.2	F	0.92	27.7	D
	HOV	NB	0.86	19.8	C	1.04	24.2	F	0.98	22.5	C	1.26	30.9	F
		SB	0.76	28.1	D	0.65	23.3	C	0.90	36.2	E	0.75	27.7	D

Notes:

1. Density is shown in passenger cars/mile/lane (pc/mi/ln).
2. Level of Service (LOS): General Purpose (GP) lane and High Occupancy Vehicle (HOV) lane LOS is based on density except when volume-to-capacity (v/c) ratio is greater than or equal to 1.0, which is LOS F.
3. * Future Conditions (Years 2020 and 2040): Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table O-19 Years 2020 and 2040 Alternative 3 Mainline Peak Hour Level of Service													
Location	Lane Type	Direction	Year 2020 Alternative 3						Year 2040 Alternative 3				
			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour	
			v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹	LOS ²	v/c	Density ¹

Source: Albert Grover & Associates, 2011

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L2: Los Angeles County Traffic Tables

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Table 2-3: Year 2009 Existing Mainline Peak Hour Level of Service

Segment Location	Lane Type	Direction	Mainline		Year 2009							
					Existing Traffic							
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour			
					Traffic Demand Volume ¹	V/C	Density ^{2,5}	LOS ³	Traffic Demand Volume ¹	V/C	Density ^{2,5}	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	9,795	1.06	43.7	E	8,666	0.94	33.3	D
		SB	5	9,250	9,199	0.99	32.6	D	8,322	0.90	34.4	D
	HOV	NB	1	1,650	1,746	1.06	--	--	1,222	0.74	--	--
		SB	1	1,650	778	0.47	--	--	1,599	0.97	--	--
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,650	1,746	1.06	--	--	1,222	0.74	--	--
		SB	1	1,650	778	0.47	--	--	1,599	0.97	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,650	1,720	1.04	--	--	1,182	0.72	--	--
		SB	1	1,650	783	0.47	--	--	1,570	0.95	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	7,907	1.07	38.7	E	7,175	0.97	37.7	E
	HOV	NB	1	1,650	1,720	1.04	--	--	1,182	0.72	--	--
		SB	1	1,650	793	0.48	--	--	1,710	1.04	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,650	1,720	1.04	--	--	1,182	0.72	--	--
		SB	1	1,650	830	0.50	--	--	1,560	0.95	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	7,240	0.98	38.2	E	6,030	0.81	26.9	D
		SB	5	9,250	7,884	0.85	26.6	D	7,733	0.84	31.9	D
	HOV	NB	1	1,650	1,380	0.84	--	--	1,440	0.87	--	--
		SB	1	1,650	830	0.50	--	--	1,560	0.95	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	4	7,400	7,240	0.98	38.2	E	6,030	0.81	26.9	D
		SB	4	7,400	6,508	0.88	27.7	D	6,428	0.87	33.1	D
	HOV	NB	1	1,650	1,380	0.84	--	--	1,440	0.87	--	--
		SB	1	1,650	830	0.50	--	--	1,560	0.95	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	7,240	0.98	38.2	E	6,030	0.81	26.9	D
		SB	4	7,400	6,420	0.87	27.2	D	6,300	0.85	32.5	D
	HOV	NB	1	1,650	1,380	0.84	--	--	1,440	0.87	--	--
		SB	1	1,650	830	0.50	--	--	1,560	0.95	--	--
I-605 Mainline												
Carson Street to HOV Transition	GP	NB	4	7,400	5,997	0.81	26.3	D	7,162	0.97	35.7	E
		SB	4	7,400	8,066	1.09	41.1	E	7,417	1.00	36.1	E
	HOV	NB	1	1,650	737	0.45	--	--	633	0.38	--	--
		SB	1	1,650	1,039	0.63	--	--	707	0.43	--	--
HOV Transition to Spring Street	GP	NB	4	7,400	5,997	0.81	26.3	D	7,162	0.97	35.7	E
		SB	5	9,250	8,066	0.87	27.9	D	7,417	0.80	26.6	D
	HOV	NB	1	1,650	737	0.45	--	--	633	0.38	--	--
		SB	--	--	--	--	--	--	--	--	--	--
Spring Street to Willow Street/Katella Avenue	GP	NB	4	7,400	5,353	0.72	21.9	C	6,453	0.87	27.2	D
		SB	4	7,400	7,442	1.01	34.0	D	6,787	0.92	29.2	D
	HOV	NB	1	1,650	737	0.45	--	--	633	0.38	--	--
		SB	--	--	--	--	--	--	--	--	--	--
Willow Street/Katella Avenue CD Road On Ramp to I-405	GP	NB	5	9,250	6,025	0.65	19.9	C	6,240	0.67	22.6	C
		SB	4	7,400	6,290	0.85	27.5	D	5,880	0.79	28.0	D
	HOV	NB	1	1,650	422	0.26	--	--	694	0.42	--	--
		SB	--	--	--	--	--	--	--	--	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	1,922	0.52	10.3	A	2,622	0.71	14.0	B
		WB	3	5,550	3,113	0.56	16.6	B	1,322	0.24	7.1	A
Studebaker Road to I-605	GP	EB	2	3,700	3,167	0.86	26.1	D	3,868	1.05	35.6	E
		WB	2	3,700	3,710	1.00	33.0	D	2,622	0.71	21.1	C

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane LOS is based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table 3-5: Year 2020 No Build Alternative Mainline Peak Hour Level of Service													
Location	Lane Type	Direction	Mainline		Year 2020 No Build Alternative Conditions								
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour				
					Traffic Demand Volume ¹	D/C	Density ²	LOS ³	Traffic Demand Volume ¹	D/C	Density ²	LOS ³	
I-405 Mainline													
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	9,530	1.03	41.5	E	9,810	1.06	41.2	E	
		SB	5	9,250	9,720	1.05	36.3	E	10,090	1.09	--*	F	
	HOV	NB	1	1,850	1,860	1.01	--	--	2,190	1.18	--	--	
		SB	1	1,850	1,820	0.98	--	--	1,960	1.06	--	--	
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table								
		SB	5	9,250	Weaving Segment - Refer to Weave Table								
	HOV	NB	1	1,850	1,860	1.01	--	--	2,190	1.18	--	--	
		SB	1	1,850	1,820	0.98	--	--	1,960	1.06	--	--	
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table								
		SB	5	9,250	Weaving Segment - Refer to Weave Table								
	HOV	NB	1	1,850	1,730	0.94	--	--	2,080	1.12	--	--	
		SB	1	1,850	1,910	1.03	--	--	2,080	1.12	--	--	
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table								
		SB	4	7,400	8,530	1.15	--*	F	8,790	1.19	--*	F	
	HOV	NB	1	1,850	1,730	0.94	--	--	2,080	1.12	--	--	
		SB	1	1,850	2,060	1.11	--	--	1,990	1.08	--	--	
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table								
		SB	5	9,250	Weaving Segment - Refer to Weave Table								
	HOV	NB	1	1,850	1,730	0.94	--	--	2,080	1.12	--	--	
		SB	1	1,850	2,140	1.16	--	--	2,060	1.11	--	--	
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	8,600	1.16	--*	F	9,560	1.29	--*	F	
		SB	5	9,250	8,550	0.92	29.7	D	9,090	0.98	38.5	E	
	HOV	NB	1	1,850	2,490	1.35	--	--	2,790	1.51	--	--	
		SB	1	1,850	2,140	1.16	--	--	2,060	1.11	--	--	
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	6,910	0.93	35.9	E	7,940	1.07	41.0	E	
		SB	4	7,400	7,150	0.97	31.8	D	7,830	1.06	43.7	E	
	HOV	NB	1	1,850	2,490	1.35	--	--	2,790	1.51	--	--	
		SB	1	1,850	2,140	1.16	--	--	2,060	1.11	--	--	
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	6,910	0.93	35.9	E	7,940	1.07	41.0	E	
		SB	4	7,400	7,050	0.95	31.1	D	7,690	1.04	42.2	E	
	HOV	NB	1	1,850	2,490	1.35	--	--	2,790	1.51	--	--	
		SB	1	1,850	2,140	1.16	--	--	2,060	1.11	--	--	
I-605 Mainline													
Carson Street to Spring Street	GP	NB	4	7,400	5,900	0.80	25.8	C	7,420	1.00	37.9	E	
		SB	4	7,400	7,750	1.05	37.7	E	7,280	0.98	35.0	D	
	HOV	NB	1	1,850	1,510	0.82	--	--	1,900	1.03	--	--	
		SB	1	1,850	1,940	1.05	--	--	1,740	0.94	--	--	
Spring Street to Willow Street/Katella Avenue	GP	NB	4	7,400	5,120	0.69	20.9	C	6,330	0.86	26.6	D	
		SB	4	7,400	6,720	0.91	28.8	D	5,840	0.79	24.1	C	
	HOV	NB	1	1,850	1,870	1.01	--	--	2,450	1.32	--	--	
		SB	1	1,850	2,140	1.16	--	--	1,840	0.99	--	--	
Willow Street/Katella Avenue CD Road On Ramp to I-405	GP	NB	5	9,250	5,120	0.55	17.0	B	5,740	0.62	20.8	C	
		SB	4	7,400	5,660	0.76	24.3	C	5,140	0.69	24.5	C	
	HOV	NB	1	1,850	1,690	0.91	--	--	2,220	1.20	--	--	
		SB	1	1,850	1,660	0.90	--	--	1,470	0.79	--	--	
7th Street Mainline													
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	3,270	0.88	17.5	B	3,160	0.85	16.9	B	
		WB	3	5,550	3,690	0.66	19.7	C	2,870	0.52	15.3	B	
Studebaker Road to I-605	GP	EB	2	3,700	4,390	1.19	--*	F	4,010	1.08	38.4	E	
		WB	2	3,700	3,910	1.06	36.4	E	3,900	1.05	36.2	E	

Notes:

1. Peak hour capacity and traffic volume are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane LOS is based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lane include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table 3-8: Year 2040 No Build Alternative Mainline Peak Hour Level of Service												
Location	Lane Type	Direction	Mainline		Year 2040 No Build Alternative Conditions							
			Lanes	Capacity ^{1,4}	AM Peak Hour			PM Peak Hour				
					Traffic Demand Volume ¹	D/C	Density ²	LOS ³	Traffic Demand Volume ¹	D/C	Density ²	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	10,300	1.11	--*	F	10,610	1.15	--*	F
		SB	5	9,250	10,500	1.14	43.9	E	10,910	1.18	--*	F
	HOV	NB	1	1,850	2,010	1.09	--	--	2,370	1.28	--	--
		SB	1	1,850	1,970	1.06	--	--	2,120	1.15	--	--
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,010	1.09	--	--	2,370	1.28	--	--
		SB	1	1,850	1,970	1.06	--	--	2,120	1.15	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	1,870	1.01	--	--	2,250	1.22	--	--
		SB	1	1,850	2,060	1.11	--	--	2,240	1.21	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	9,220	1.25	--*	F	9,500	1.28	--*	F
	HOV	NB	1	1,850	1,870	1.01	--	--	2,250	1.22	--	--
		SB	1	1,850	2,230	1.21	--	--	2,150	1.16	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	1,870	1.01	--	--	2,250	1.22	--	--
		SB	1	1,850	2,310	1.25	--	--	2,230	1.21	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	9,290	1.26	--*	F	10,330	1.40	--*	F
		SB	5	9,250	9,240	1.00	33.7	D	9,830	1.06	44.1	E
	HOV	NB	1	1,850	2,700	1.46	--	--	3,020	1.63	--	--
		SB	1	1,850	2,310	1.25	--	--	2,230	1.21	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	7,470	1.01	40.1	E	8,590	1.16	--*	F
		SB	4	7,400	7,730	1.04	36.7	E	8,460	1.14	--*	F
	HOV	NB	1	1,850	2,700	1.46	--	--	3,020	1.63	--	--
		SB	1	1,850	2,310	1.25	--	--	2,230	1.21	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	7,470	1.01	40.1	E	8,590	1.16	--*	F
		SB	4	7,400	7,630	1.03	35.8	E	8,310	1.12	--*	F
	HOV	NB	1	1,850	2,700	1.46	--	--	3,020	1.63	--	--
		SB	1	1,850	2,310	1.25	--	--	2,230	1.21	--	--
I-605 Mainline												
Carson Street to Spring Street	GP	NB	4	7,400	6,380	0.86	28.3	D	8,020	1.08	44.4	E
		SB	4	7,400	8,370	1.13	--*	F	7,870	1.06	40.6	E
	HOV	NB	1	1,850	1,630	0.88	--	--	2,050	1.11	--	--
		SB	1	1,850	2,100	1.14	--	--	1,880	1.02	--	--
Spring Street to Willow Street/Katella Avenue	GP	NB	4	7,400	5,540	0.75	22.7	C	6,840	0.92	29.6	D
		SB	4	7,400	7,260	0.98	32.6	D	6,310	0.85	26.5	D
	HOV	NB	1	1,850	1,630	0.88	--	--	2,050	1.11	--	--
		SB	1	1,850	2,100	1.14	--	--	1,880	1.02	--	--
Willow Street/Katella Avenue CD Road On Ramp to I-405	GP	NB	5	9,250	5,540	0.60	18.3	C	6,200	0.67	22.5	C
		SB	4	7,400	6,120	0.83	26.6	D	5,560	0.75	26.5	D
	HOV	NB	1	1,850	2,020	1.09	--	--	2,650	1.43	--	--
		SB	1	1,850	2,310	1.25	--	--	1,990	1.08	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	3,540	0.96	18.9	C	3,420	0.92	18.3	C
		WB	3	5,550	3,990	0.72	21.4	C	3,100	0.56	16.6	B
Studebaker Road to I-605	GP	EB	2	3,700	4,750	1.28	--*	F	4,340	1.17	--*	F
		WB	2	3,700	4,220	1.14	43.4	E	4,210	1.14	43.1	E

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane LOS is based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table 4-5: Year 2020 Alternative 1 Mainline Peak Hour Level of Service												
Location	Lane Type	Direction	Mainline		Year 2020 Alternative 1 Conditions							
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour			
					Traffic Demand Volume ¹	D/C	Density ²	LOS ³	Traffic Demand Volume ¹	D/C	Density ²	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	9,540	1.03	41.6	E	10,400	1.12	--*	F
		SB	5	9,250	9,680	1.05	36.0	E	10,050	1.09	--*	F
	HOV	NB	1	1,850	2,070	1.12	--	--	1,980	1.07	--	--
		SB	1	1,850	1,990	1.08	--	--	2,140	1.16	--	--
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,060	1.11	--	--	2,050	1.11	--	--
		SB	1	1,850	1,990	1.08	--	--	2,140	1.16	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,060	1.11	--	--	2,050	1.11	--	--
		SB	1	1,850	1,990	1.08	--	--	2,140	1.16	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	8,570	1.17	--*	F	8,810	1.19	--*	F
	HOV	NB	1	1,850	2,070	1.12	--	--	2,060	1.11	--	--
		SB	1	1,850	2,180	1.18	--	--	2,020	1.09	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,070	1.12	--	--	2,060	1.11	--	--
		SB	1	1,850	2,240	1.21	--	--	2,020	1.09	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	8,810	1.19	--*	F	10,380	1.40	--*	F
		SB	5	9,250	8,740	0.94	30.7	D	9,090	0.98	38.5	E
	HOV	NB	1	1,850	2,410	1.30	--	--	1,990	1.08	--	--
		SB	1	1,850	2,240	1.21	--	--	2,010	1.09	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	7,260	0.98	38.4	E	8,900	1.20	--*	F
		SB	4	7,400	7,460	1.01	34.3	D	8,030	1.09	--*	F
	HOV	NB	1	1,850	2,410	1.30	--	--	1,990	1.08	--	--
		SB	1	1,850	2,140	1.16	--	--	2,010	1.09	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	7,260	0.98	38.4	E	8,900	1.20	--*	F
		SB	4	7,400	7,380	1.00	33.6	D	7,910	1.07	44.6	E
	HOV	NB	1	1,850	2,410	1.30	--	--	1,990	1.08	--	--
		SB	1	1,850	2,140	1.16	--	--	2,010	1.09	--	--
I-605 Mainline												
Carson Street to Spring Street	GP	NB	4	7,400	6,140	0.83	27.0	D	7,490	1.01	38.5	E
		SB	4	7,400	7,890	1.07	39.1	E	7,420	1.00	36.1	E
	HOV	NB	1	1,850	1,590	0.86	--	--	1,980	1.07	--	--
		SB	1	1,850	1,900	1.03	--	--	1,780	0.96	--	--
Spring Street to Willow Street/Katella Avenue	GP	NB	4	7,400	5,360	0.72	21.9	C	6,410	0.87	27.0	D
		SB	4	7,400	6,870	0.93	29.8	D	6,010	0.81	24.9	C
	HOV	NB	1	1,850	1,850	1.00	--	--	2,430	1.31	--	--
		SB	1	1,850	2,200	1.19	--	--	1,890	1.02	--	--
Willow Street/Katella Avenue CD Road On Ramp to I-405	GP	NB	5	9,250	5,320	0.58	17.6	B	6,630	0.72	24.0	C
		SB	4	7,400	5,770	0.78	24.8	C	5,220	0.71	24.8	C
	HOV	NB	1	1,850	1,480	0.80	--	--	1,990	1.08	--	--
		SB	1	1,850	1,400	0.76	--	--	980	0.53	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	3,160	0.85	16.9	B	2,750	0.74	14.7	B
		WB	3	5,550	3,980	0.72	21.3	C	2,900	0.52	15.5	B
Studebaker Road to I-605	GP	EB	2	3,700	4,410	1.19	--*	F	3,630	0.98	31.8	D
		WB	2	3,700	4,240	1.15	43.9	E	4,030	1.09	38.8	E

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) Lane LOS is based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table 4-8: Year 2040 Alternative 1 Mainline Peak Hour Level of Service												
Location	Lane Type	Direction	Mainline		Year 2040 Alternative 1 Conditions							
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour			
					Traffic Demand Volume ¹	D/C	Density ²	LOS ³	Traffic Demand Volume ¹	D/C	Density ²	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	10,310	1.11	--*	F	11,240	1.22	--*	F
		SB	5	9,250	10,460	1.13	43.5	E	10,860	1.17	--*	F
	HOV	NB	1	1,850	2,240	1.21	--	--	2,140	1.16	--	--
		SB	1	1,850	2,160	1.17	--	--	2,310	1.25	--	--
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,220	1.20	--	--	2,210	1.19	--	--
		SB	1	1,850	2,160	1.17	--	--	2,310	1.25	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,220	1.20	--	--	2,210	1.19	--	--
		SB	1	1,850	2,150	1.16	--	--	2,310	1.25	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	9,370	1.27	--*	F	9,530	1.29	--*	F
	HOV	NB	1	1,850	2,240	1.21	--	--	2,220	1.20	--	--
		SB	1	1,850	2,350	1.27	--	--	2,180	1.18	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,240	1.21	--	--	2,220	1.20	--	--
		SB	1	1,850	2,420	1.31	--	--	2,180	1.18	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	9,520	1.29	--*	F	11,220	1.52	--*	F
		SB	5	9,250	9,450	1.02	35.1	E	9,830	1.06	44.1	E
	HOV	NB	1	1,850	2,610	1.41	--	--	2,150	1.16	--	--
		SB	1	1,850	2,420	1.31	--	--	2,170	1.17	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	7,850	1.06	43.9	E	9,620	1.30	--*	F
		SB	4	7,400	8,060	1.09	40.2	E	8,270	1.12	--*	F
	HOV	NB	1	1,850	2,610	1.41	--	--	2,150	1.16	--	--
		SB	1	1,850	2,420	1.31	--	--	2,170	1.17	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	7,850	1.06	43.9	E	9,620	1.30	--*	F
		SB	4	7,400	7,980	1.08	39.3	E	8,140	1.10	--*	F
	HOV	NB	1	1,850	2,610	1.41	--	--	2,150	1.16	--	--
		SB	1	1,850	2,310	1.25	--	--	2,170	1.17	--	--
I-605 Mainline												
Carson Street to Spring Street	GP	NB	4	7,400	6,640	0.90	29.8	D	8,100	1.09	--*	F
		SB	4	7,400	8,530	1.15	--*	F	8,020	1.08	42.4	E
	HOV	NB	1	1,850	1,720	0.93	--	--	2,140	1.16	--	--
		SB	1	1,850	2,050	1.11	--	--	1,920	1.04	--	--
Spring Street to Willow Street/Katella Avenue	GP	NB	4	7,400	5,790	0.78	23.8	C	6,930	0.94	30.2	D
		SB	4	7,400	7,420	1.00	33.9	D	6,500	0.88	27.5	D
	HOV	NB	1	1,850	2,000	1.08	--	--	2,630	1.42	--	--
		SB	1	1,850	2,370	1.28	--	--	2,040	1.10	--	--
Willow Street/Katella Avenue CD Road On Ramp to I-405	GP	NB	5	9,250	5,750	0.62	19.0	C	7,170	0.78	26.0	D
		SB	4	7,400	6,240	0.84	27.2	D	5,650	0.76	26.9	D
	HOV	NB	1	1,850	2,000	1.08	--	--	2,630	1.42	--	--
		SB	1	1,850	1,520	0.82	--	--	1,060	0.57	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	3,160	0.85	16.9	B	2,750	0.74	14.7	B
		WB	3	5,550	3,980	0.72	21.3	C	2,900	0.52	15.5	B
Studebaker Road to I-605	GP	EB	2	3,700	4,410	1.19	--*	F	3,630	0.98	31.8	D
		WB	2	3,700	4,240	1.15	43.9	E	4,030	1.09	38.8	E

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane LOS is based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table 5-5: Year 2020 Alternative 2 Mainline Peak Hour Level of Service												
Location	Lane Type	Direction	Mainline		Year 2020 Alternative 2 Conditions							
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour			
					Traffic Demand Volume ¹	D/C	Density ²	LOS ³	Traffic Demand Volume ¹	D/C	Density ²	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	9,600	1.04	42.1	E	10,060	1.09	43.6	E
		SB	5	9,250	9,660	1.04	35.9	E	10,030	1.08	--*	F
	HOV	NB	1	1,850	2,040	1.10	--	--	2,280	1.23	--	--
		SB	1	1,850	1,920	1.04	--	--	1,810	0.98	--	--
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	1,980	1.07	--	--	2,240	1.21	--	--
		SB	1	1,850	1,920	1.04	--	--	1,810	0.98	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,060	1.11	--	--	2,240	1.21	--	--
		SB	1	1,850	1,920	1.04	--	--	1,810	0.98	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	8,730	1.18	--*	F	8,920	1.21	--*	F
	HOV	NB	1	1,850	2,030	1.10	--	--	2,060	1.11	--	--
		SB	1	1,850	2,160	1.17	--	--	2,020	1.09	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,030	1.10	--	--	2,340	1.26	--	--
		SB	1	1,850	2,210	1.19	--	--	2,020	1.09	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	8,850	1.20	--*	F	10,130	1.37	--*	F
		SB	5	9,250	8,740	0.94	30.7	D	9,150	0.99	38.9	E
	HOV	NB	1	1,850	2,300	1.24	--	--	2,710	1.46	--	--
		SB	1	1,850	2,210	1.19	--	--	2,010	1.09	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	7,340	0.99	39.0	E	8,700	1.18	--*	F
		SB	4	7,400	7,480	1.01	34.4	D	8,160	1.10	--*	F
	HOV	NB	1	1,850	2,300	1.24	--	--	2,710	1.46	--	--
		SB	1	1,850	2,210	1.19	--	--	2,360	1.28	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	7,340	0.99	39.0	E	8,700	1.18	--*	F
		SB	4	7,400	7,390	1.00	33.7	D	8,040	1.09	--*	F
	HOV	NB	1	1,850	2,300	1.24	--	--	2,710	1.46	--	--
		SB	1	1,850	2,210	1.19	--	--	2,360	1.28	--	--
I-605 Mainline												
Carson Steet to Spring Street	GP	NB	4	7,400	5,540	0.75	24.1	C	6,490	0.88	31.3	D
		SB	4	7,400	8,000	1.08	40.4	E	7,400	1.00	36.0	E
	HOV	NB	1	1,850	1,570	0.85	--	--	2,040	1.10	--	--
		SB	1	1,850	2,020	1.09	--	--	1,800	0.97	--	--
Spring Street to Willow Street/Katella Ave	GP	NB	4	7,400	4,810	0.65	19.6	C	5,450	0.74	22.3	C
		SB	4	7,400	6,960	0.94	30.4	D	5,970	0.81	24.7	C
	HOV	NB	1	1,850	1,850	1.00	--	--	2,450	1.32	--	--
		SB	1	1,850	2,240	1.21	--	--	2,000	1.08	--	--
Willow Street/Katella Ave CD Road On Ramp to I-405	GP	NB	5	9,250	4,810	0.52	15.9	B	5,680	0.61	20.6	C
		SB	4	7,400	5,910	0.80	25.5	C	5,170	0.70	24.6	C
	HOV	NB	1	1,850	1,490	0.81	--	--	2,000	1.08	--	--
		SB	1	1,850	1,770	0.96	--	--	1,580	0.85	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	3,180	0.86	17.0	B	2,770	0.75	14.8	B
		WB	3	5,550	4,010	0.72	21.5	C	3,080	0.55	16.5	B
Studebaker Road to I-605	GP	EB	2	3,700	4,350	1.18	--*	F	3,530	0.95	30.4	D
		WB	2	3,700	4,200	1.14	42.9	E	4,120	1.11	40.9	E

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane based on density except when demand-to-capacity (D/C) ratios greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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Table 5-8: Year 2040 Alternative 2 Mainline Peak Hour Level of Service												
Location	Lane Type	Direction	Mainline		Year 2040 Alternative 2 Conditions							
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour			
					Traffic Demand Volume ¹	D/C	Density ²	LOS ³	Traffic Demand Volume ¹	D/C	Density ²	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	10,370	1.12	--*	F	10,870	1.18	--*	F
		SB	5	9,250	10,440	1.13	43.2	E	10,840	1.17	--*	F
	HOV	NB	1	1,850	2,200	1.19	--	--	2,460	1.33	--	--
		SB	1	1,850	2,070	1.12	--	--	1,960	1.06	--	--
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,140	1.16	--	--	2,420	1.31	--	--
		SB	1	1,850	2,070	1.12	--	--	1,960	1.06	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,220	1.20	--	--	2,420	1.31	--	--
		SB	1	1,850	2,070	1.12	--	--	1,960	1.06	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	9,440	1.28	--*	F	9,640	1.30	--*	F
	HOV	NB	1	1,850	2,190	1.18	--	--	2,220	1.20	--	--
		SB	1	1,850	2,330	1.26	--	--	2,180	1.18	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,190	1.18	--	--	2,540	1.37	--	--
		SB	1	1,850	2,380	1.29	--	--	2,180	1.18	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	9,560	1.29	--*	F	10,950	1.48	--*	F
		SB	5	9,250	9,450	1.02	35.1	E	9,890	1.07	44.7	E
	HOV	NB	1	1,850	2,490	1.35	--	--	2,930	1.58	--	--
		SB	1	1,850	2,380	1.29	--	--	2,170	1.17	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	7,940	1.07	45.0	E	9,400	1.27	--*	F
		SB	4	7,400	8,090	1.09	40.5	E	8,830	1.19	--*	F
	HOV	NB	1	1,850	2,490	1.35	--	--	2,930	1.58	--	--
		SB	1	1,850	2,380	1.29	--	--	2,560	1.38	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	7,940	1.07	45.0	E	9,400	1.27	--*	F
		SB	4	7,400	7,990	1.08	39.4	E	8,690	1.17	--*	F
	HOV	NB	1	1,850	2,490	1.35	--	--	2,930	1.58	--	--
		SB	1	1,850	2,380	1.29	--	--	2,560	1.38	--	--
I-605 Mainline												
Carson Street to Spring Street	GP	NB	4	7,400	5,990	0.81	26.2	D	7,020	0.95	34.7	D
		SB	4	7,400	8,650	1.17	--*	F	8,000	1.08	42.2	E
	HOV	NB	1	1,850	1,700	0.92	--	--	2,200	1.19	--	--
		SB	1	1,850	2,180	1.18	--	--	1,950	1.05	--	--
Spring Street to Willow Street/Katella Ave	GP	NB	4	7,400	5,210	0.70	21.2	C	5,900	0.80	24.4	C
		SB	4	7,400	7,520	1.02	34.7	D	6,450	0.87	27.2	D
	HOV	NB	1	1,850	2,000	1.08	--	--	2,650	1.43	--	--
		SB	1	1,850	2,420	1.31	--	--	2,160	1.17	--	--
Willow Street/Katella Ave CD Road On Ramp to I-405	GP	NB	5	9,250	5,200	0.56	17.2	B	6,140	0.66	22.3	C
		SB	4	7,400	6,390	0.86	28.0	D	5,580	0.75	26.6	D
	HOV	NB	1	1,850	1,610	0.87	--	--	2,160	1.17	--	--
		SB	1	1,850	1,910	1.03	--	--	1,710	0.92	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	3,180	0.86	17.0	B	2,770	0.75	14.8	B
		WB	3	5,550	4,010	0.72	21.5	C	3,080	0.55	16.5	B
Studebaker Road to I-605	GP	EB	2	3,700	4,350	1.18	--*	F	3,530	0.95	30.4	D
		WB	2	3,700	4,200	1.14	42.9	E	4,120	1.11	40.9	E

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane LOS is based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

I-405 Improvement Project Supplemental Traffic Study

Long Beach Area

Table 6-5: Year 2020 Alternative 3 Mainline Peak Hour Level of Service												
Location	Lane Type	Direction	Mainline		Year 2020 Alternative 3 Conditions							
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour			
					Traffic Demand Volume ¹	D/C	Density ²	LOS ³	Traffic Demand Volume ¹	D/C	Density ²	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Willow Street	GP	NB	5	9,250	9,930	1.07	--*	F	10,550	1.14	--*	F
		SB	5	9,250	9,910	1.07	37.9	E	10,290	1.11	--*	F
	HOV	NB	1	1,850	1,850	1.00	--	--	2,040	1.10	--	--
		SB	1	1,850	1,660	0.90	--	--	1,960	1.06	--	--
Lakewood Boulevard/Willow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	1,820	0.98	--	--	2,060	1.11	--	--
		SB	1	1,850	1,660	0.90	--	--	2,130	1.15	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	1,870	1.01	--	--	1,870	1.01	--	--
		SB	1	1,850	1,680	0.91	--	--	2,130	1.15	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	8,890	1.20	--*	F	9,110	1.23	--*	F
	HOV	NB	1	1,850	1,820	0.98	--	--	1,850	1.00	--	--
		SB	1	1,850	1,740	0.94	--	--	2,130	1.15	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	1,660	0.90	--	--	1,850	1.00	--	--
		SB	1	1,850	1,740	0.94	--	--	1,970	1.06	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	9,090	1.23	--*	F	10,480	1.42	--*	F
		SB	5	9,250	9,000	0.97	32.2	D	9,470	1.02	41.1	E
	HOV	NB	1	1,850	2,070	1.12	--	--	2,290	1.24	--	--
		SB	1	1,850	1,770	0.96	--	--	1,970	1.06	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	9,090	1.23	--*	F	10,480	1.42	--*	F
		SB	4	7,400	7,690	1.04	36.3	E	8,350	1.13	--*	F
	HOV	NB	1	1,850	2,070	1.12	--	--	2,290	1.24	--	--
		SB	1	1,850	1,770	0.96	--	--	1,970	1.06	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	7,640	1.03	41.7	E	9,040	1.22	--*	F
		SB	4	7,400	7,600	1.03	35.5	E	8,190	1.11	--*	F
	HOV	NB	1	1,850	2,070	1.12	--	--	2,290	1.24	--	--
		SB	1	1,850	1,770	0.96	--	--	1,970	1.06	--	--
I-605 Mainline												
Carson Street to Spring Street	GP	NB	4	7,400	5,740	0.78	25.0	C	6,530	0.88	31.5	D
		SB	4	7,400	7,730	1.04	37.4	E	7,600	1.03	37.8	E
	HOV	NB	1	1,850	1,490	0.81	--	--	1,760	0.95	--	--
		SB	1	1,850	1,490	0.81	--	--	1,400	0.76	--	--
Spring Street to Willow Street/Katella Ave	GP	NB	4	7,400	4,990	0.67	20.3	C	5,500	0.74	22.5	C
		SB	4	7,400	6,670	0.90	28.5	D	6,190	0.84	25.8	C
	HOV	NB	1	1,850	1,840	0.99	--	--	1,870	1.01	--	--
		SB	1	1,850	1,490	0.81	--	--	1,400	0.76	--	--
Willow Street/Katella Ave CD Road On Ramp to I-405	GP	NB	5	9,250	5,010	0.54	16.6	B	5,750	0.62	20.9	C
		SB	4	7,400	5,660	0.76	24.3	C	5,500	0.74	26.2	D
	HOV	NB	1	1,850	1,370	0.74	--	--	1,800	0.97	--	--
		SB	1	1,850	1,360	0.74	--	--	1,400	0.76	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	2,950	0.80	15.8	B	2,730	0.74	14.6	B
		WB	3	5,550	3,860	0.70	20.7	C	3,830	0.69	20.5	C
Studebaker Road to I-605	GP	EB	2	3,700	4,140	1.12	41.3	E	3,560	0.96	30.8	D
		WB	2	3,700	4,120	1.11	40.9	E	4,850	1.31	--*	F

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

I-405 Improvement Project Supplemental Traffic Study

Long Beach Area

Table 6-8: Year 2040 Alternative 3 Mainline Peak Hour Level of Service

Segment Location	Lane Type	Direction	Mainline		Year 2040							
					Alternative 3 Traffic on No Build Geometry							
			Lanes	Capacity ^{1,4}	AM Peak Hour				PM Peak Hour			
					Traffic Demand Volume ¹	D/C	Density ^{2,5}	LOS ³	Traffic Demand Volume ¹	D/C	Density ^{2,5}	LOS ³
I-405 Mainline												
Temple Avenue to Lakewood Boulevard/Wilow Street	GP	NB	5	9,250	10,730	1.16	--*	F	11,410	1.23	--*	F
		SB	5	9,250	10,710	1.16	--*	F	11,130	1.20	--*	F
	HOV	NB	1	1,850	2,310	1.25	--	--	2,570	1.39	--	--
		SB	1	1,850	2,160	1.17	--	--	2,460	1.33	--	--
Lakewood Boulevard/Wilow Street to Bellflower Boulevard	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,240	1.21	--	--	2,510	1.36	--	--
		SB	1	1,850	2,170	1.17	--	--	2,400	1.30	--	--
Bellflower Boulevard to Woodruff Avenue	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,260	1.22	--	--	2,490	1.35	--	--
		SB	1	1,850	2,190	1.18	--	--	2,500	1.35	--	--
Woodruff Avenue to Palo Verde Avenue/Stearns Street	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	4	7,400	9,610	1.30	--*	F	9,850	1.33	--*	F
	HOV	NB	1	1,850	2,280	1.23	--	--	2,650	1.43	--	--
		SB	1	1,850	2,450	1.32	--	--	2,670	1.44	--	--
Palo Verde Avenue/Stearns Street to Studebaker Road	GP	NB	5	9,250	Weaving Segment - Refer to Weave Table							
		SB	5	9,250	Weaving Segment - Refer to Weave Table							
	HOV	NB	1	1,850	2,300	1.24	--	--	2,650	1.43	--	--
		SB	1	1,850	2,450	1.32	--	--	2,620	1.42	--	--
Studebaker Road to I-605 NB Off Ramp	GP	NB	4	7,400	9,830	1.33	--*	F	11,330	1.53	--*	F
		SB	5	9,250	9,730	1.05	37.2	E	10,240	1.11	--*	F
	HOV	NB	1	1,850	2,620	1.42	--	--	3,060	1.65	--	--
		SB	1	1,850	2,510	1.36	--	--	2,660	1.44	--	--
I-605 NB Off Ramp to 7th St Off Ramp	GP	NB	1	7,400	9,830	1.33	--*	F	11,330	1.53	--*	F
		SB	4	7,400	8,320	1.12	43.4	E	9,030	1.22	--*	F
	HOV	NB	1	1,850	2,620	1.42	--	--	3,060	1.65	--	--
		SB	1	1,850	2,510	1.36	--	--	2,660	1.44	--	--
7th St Off Ramp to I-605 SB On Ramp	GP	NB	4	7,400	8,260	1.12	--*	F	9,780	1.32	--*	F
		SB	4	7,400	8,220	1.11	42.1	E	8,850	1.20	--*	F
	HOV	NB	1	1,850	2,620	1.42	--	--	3,060	1.65	--	--
		SB	1	1,850	2,510	1.36	--	--	2,660	1.44	--	--
I-605 Mainline												
Carson Steet to HOV Transition	GP	NB	4	7,400	6,210	0.84	27.4	D	7,060	0.95	35.0	D
		SB	4	7,400	8,360	1.13	--*	F	8,220	1.11	--*	F
	HOV	NB	1	1,850	1,620	0.88	--	--	1,900	1.03	--	--
		SB	1	1,850	1,620	0.88	--	--	1,520	0.82	--	--
Spring Street to Willow Street/Katella Avenue	GP	NB	4	7,400	5,390	0.73	22.0	C	5,950	0.80	24.6	C
		SB	4	7,400	7,210	0.97	32.2	D	6,690	0.90	28.7	D
	HOV	NB	1	1,850	1,990	1.08	--	--	2,020	1.09	--	--
		SB	1	1,850	1,620	0.88	--	--	1,520	0.82	--	--
Willow Street/Katella Avenue CD Road On Ramp to I-405	GP	NB	5	9,250	5,420	0.59	18.0	B	6,210	0.67	22.5	C
		SB	4	7,400	6,120	0.83	26.6	D	5,940	0.80	28.3	D
	HOV	NB	1	1,850	1,490	0.81	--	--	1,950	1.05	--	--
		SB	1	1,850	1,480	0.80	--	--	1,520	0.82	--	--
7th Street Mainline												
Pepper Tree Lane to Studebaker Road	GP	EB	2	3,700	2,950	0.80	15.8	B	2,730	0.74	14.6	B
		WB	3	5,550	3,860	0.70	20.7	C	3,830	0.69	20.5	C
Studebaker Road to I-605	GP	EB	2	3,700	4,140	1.12	41.3	E	3,560	0.96	30.8	D
		WB	2	3,700	4,120	1.11	40.9	E	4,850	1.31	--*	F

Notes:

1. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
2. Density is shown in passenger cars/mile/lane (pc/mi/ln).
3. Level of Service (LOS): General Purpose (GP) lane LOS is based on density except when demand-to-capacity (D/C) ratio is greater than or equal to 1.0, which is LOS F.
4. Peak hour capacities for freeway lanes include 1,850 vph for each GP lane and a single High Occupancy Vehicle (HOV) lane.
5. * Density is in excess of 45 pc/mi/ln; therefore LOS is F.

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L3: Los Angeles County Recommended Improvements



I-405 PA/ED Long Beach Study

FIGURE 4-5

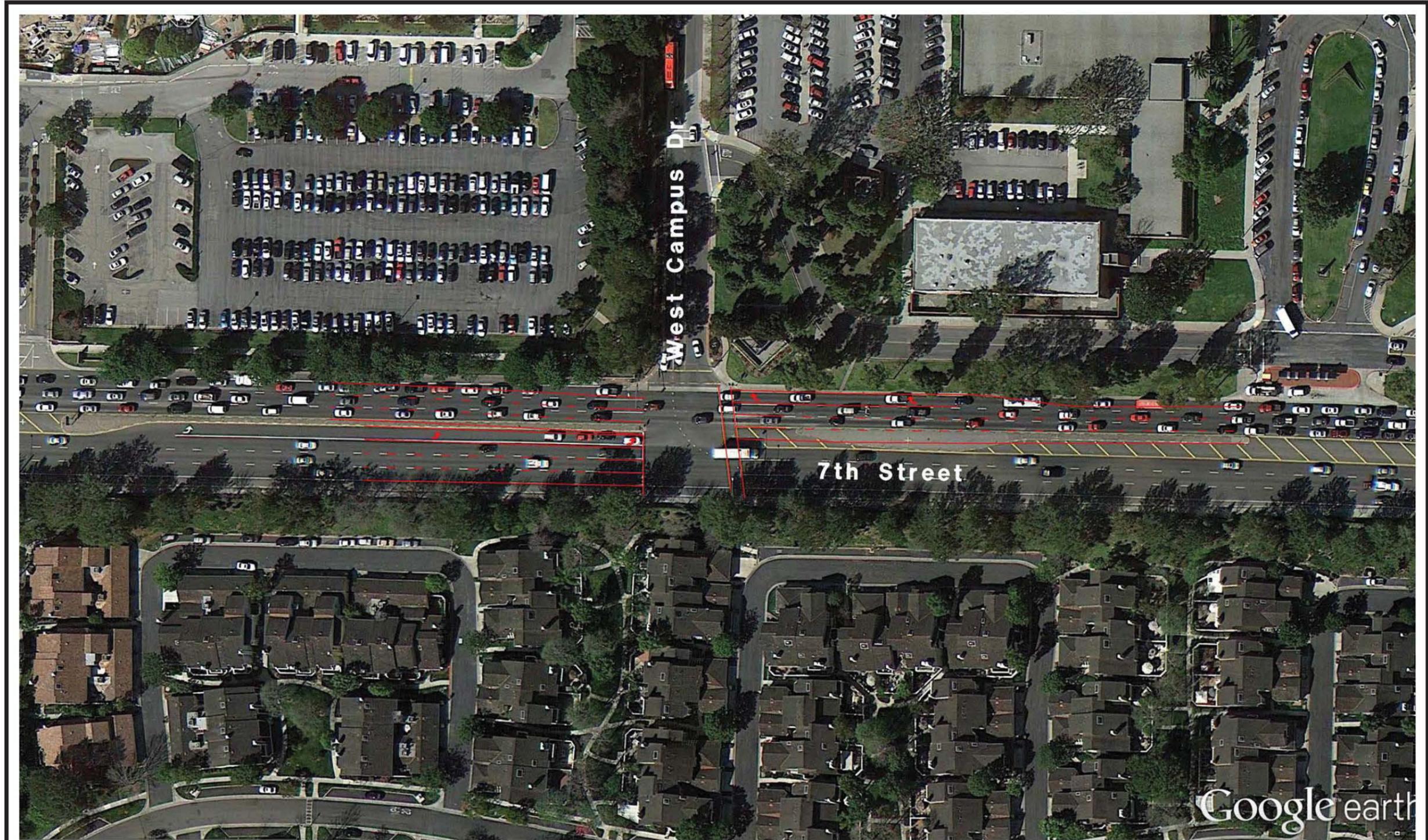
LOS COYOTES DIAGONAL AND
BELLFLOWER BOULEVARD INTERSECTION
PROPOSED IMPROVEMENTS

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I-405 PA&D Long Beach Study
FIGURE 4-6
SR-22 WB ON/OFF RAMP AND
COLLEGE PARK DRIVE INTERSECTION
PROPOSED IMPROVEMENTS

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I-405 PA/ED Long Beach Study

FIGURE 4-7

7th STREET AND
W. CAMPUS DRIVE INTERSECTION
PROPOSED IMPROVEMENTS

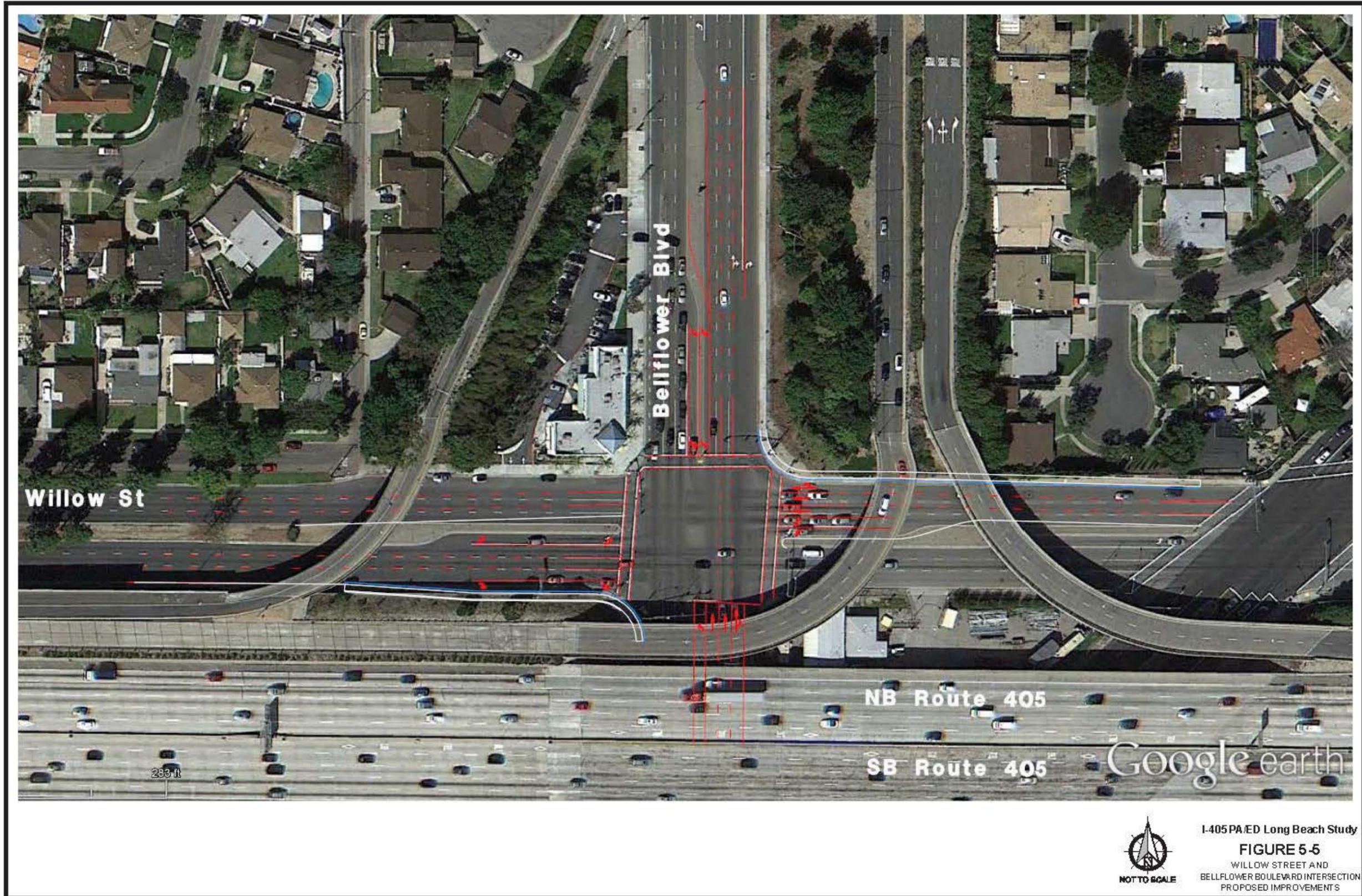
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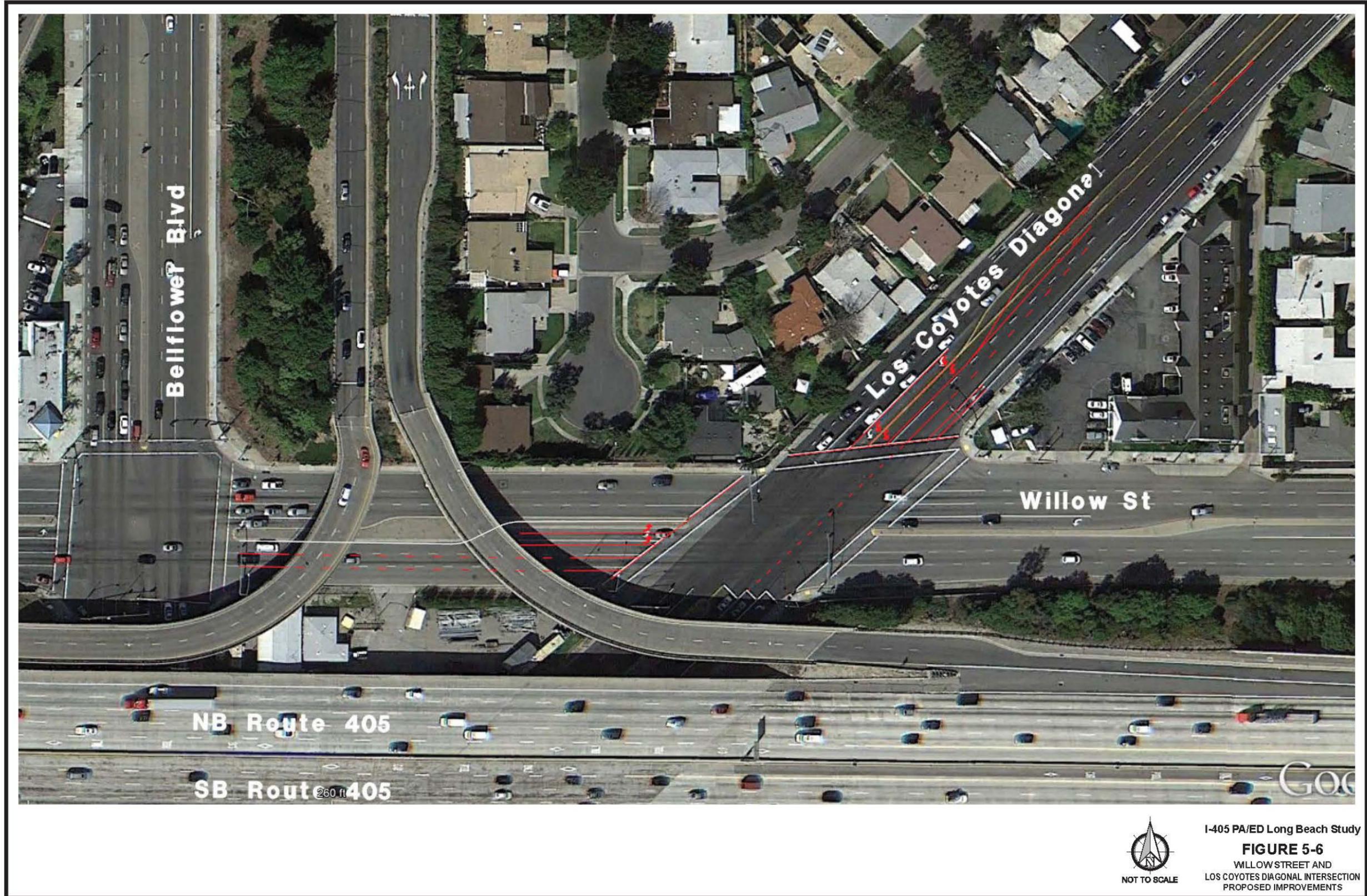
I-405 PA/ED Long Beach Study

FIGURE 4-8
7th STREET AND
BELLFLOWER BOULEVARD INTERSECTION
PROPOSED IMPROVEMENTS

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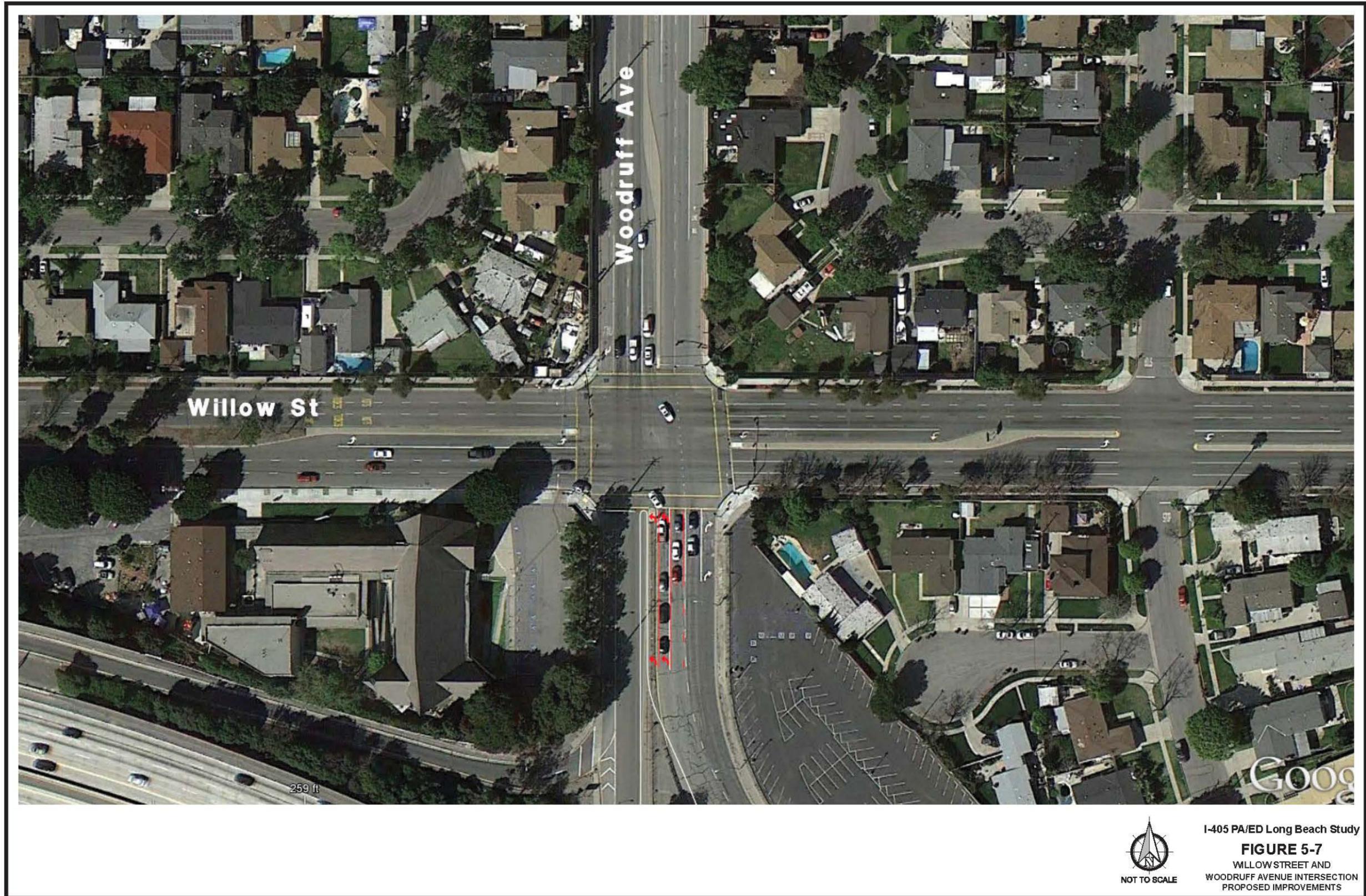


I-405 PA/ED Long Beach Study

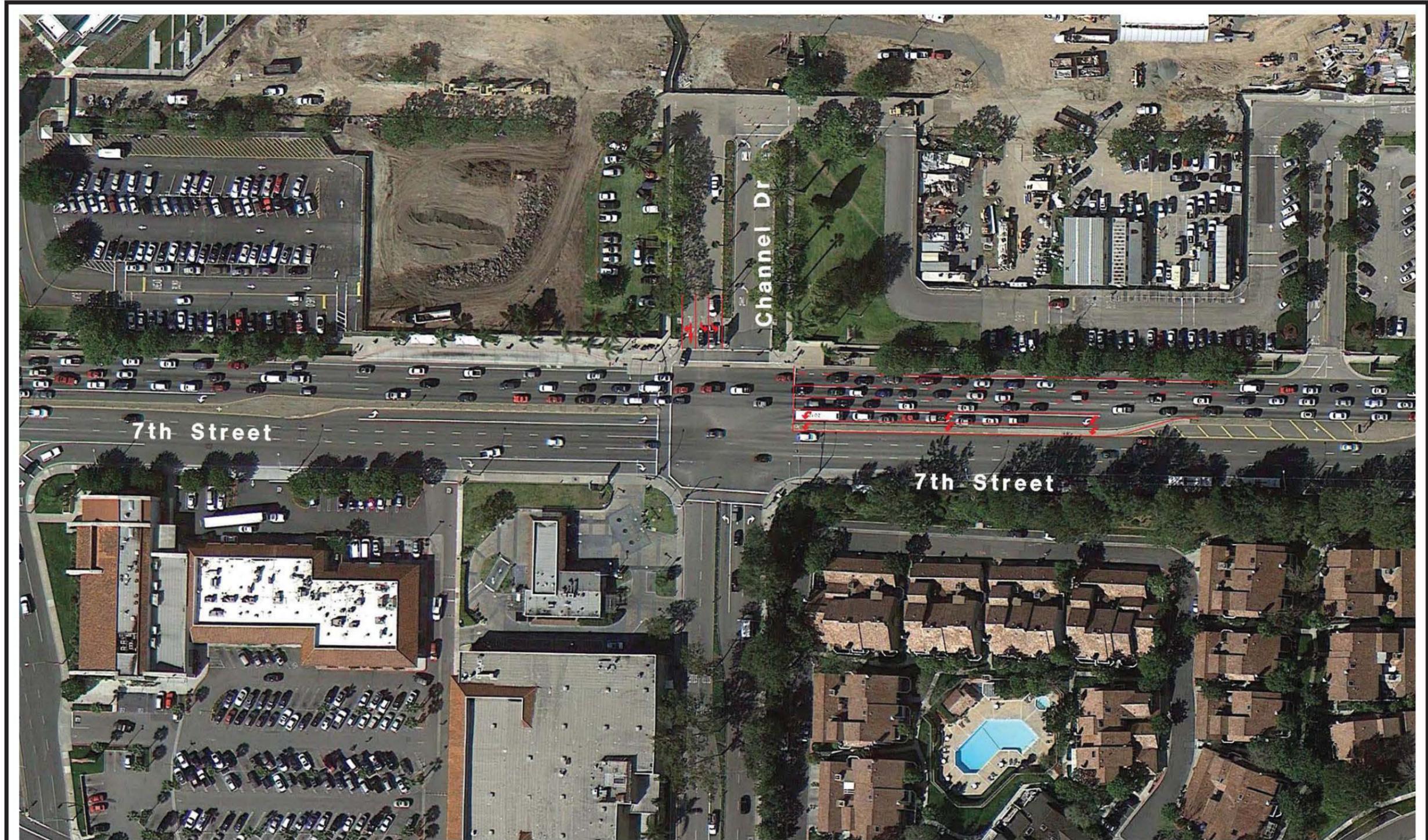
FIGURE 5-6

WILLOW STREET AND
LOS COYOTES DIAGONAL INTERSECTION
PROPOSED IMPROVEMENTS

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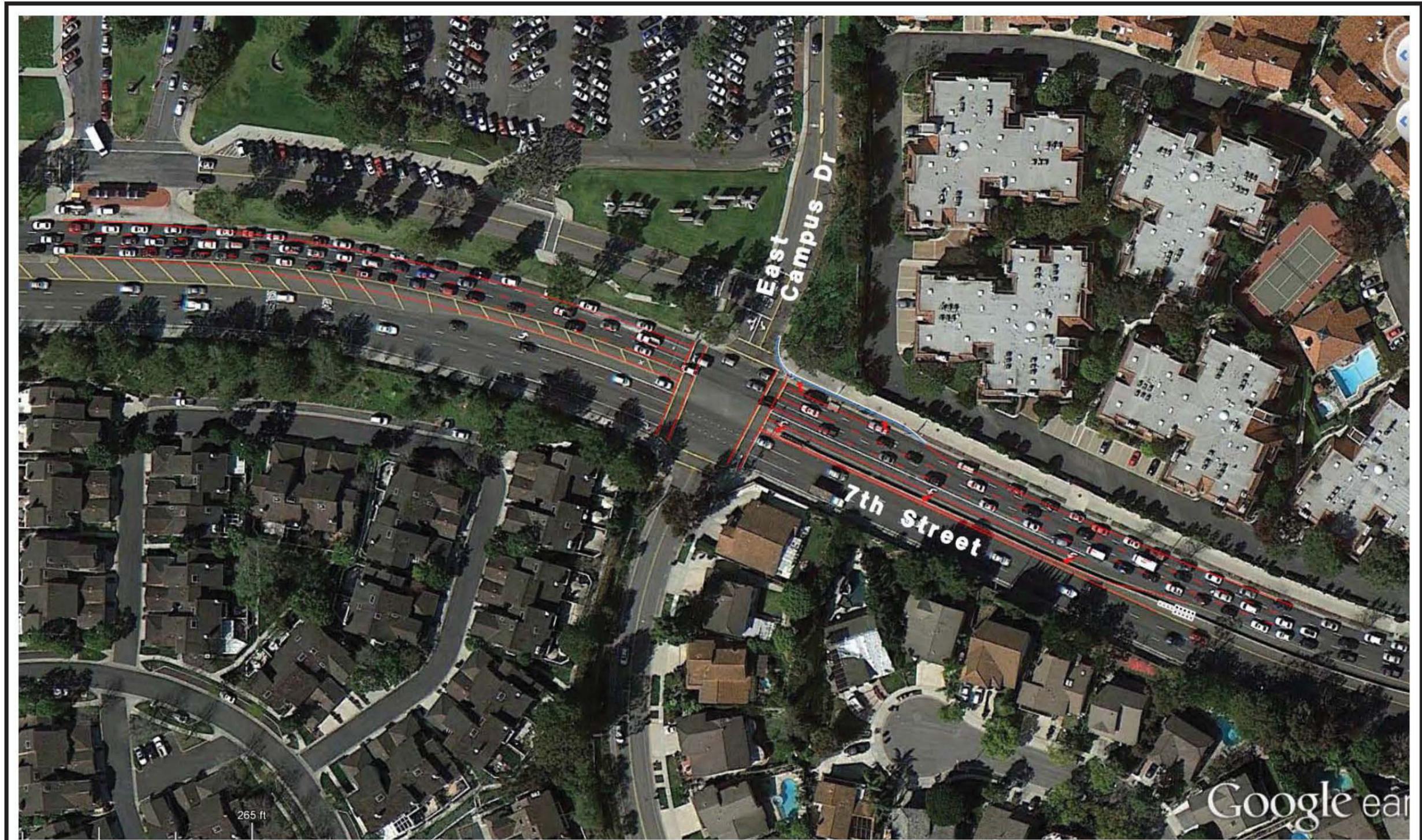


I-405 PA/ED Long Beach Study

FIGURE 5-8

7th STREET AND
CHANNEL DRIVE INTERSECTION
PROPOSED IMPROVEMENTS

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I-405 PA/ED Long Beach Study

FIGURE 5-9

7th STREET AND
E. CAMPUS DRIVE INTERSECTION
PROPOSED IMPROVEMENTS

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L4: Fair Share Calculation

I-405 PA/ED: LONG BEACH STUDY AREA FAIR SHARE PERCENTAGE CALCULATION

$$P = \frac{T}{T_B - T_E}$$

P = The equitable share for the proposed project's cumulative traffic impact expressed as a percentage.

T = Additional traffic volume entering the intersection during the peak hour assuming the project compared to the No Build Alternative in vehicles per hour, vph.

T_B = The forecasted traffic volume with the project entering the intersection during the peak hour assuming the project, vph.

T_E = The existing traffic volume entering the intersection during the peak hour, vph.

ID #	Intersection	ALTERNATIVE 1 FAIR SHARE PERCENTAGE			
		T (vph)	T _B (vph)	T _E (vph)	P (%)
13	Los Coyotes Diagonal/Bellflower Boulevard	58	7191	5888	4.45%
29	SR-22 WB Ramp/College Park Drive	70	2135	1557	12.11%
30	7th Street/Pacific Coast Highway	95	7032	6220	11.70%
34	7th Street/West Campus Drive	77	5764	4923	9.16%
31	7th Street/Bellflower Boulevard*	-64	6850	6045	11.70%

* Since T is negative P is less than zero. The P value from the nearest intersection (#30) is used.

ID #	Intersection	ALTERNATIVE 2 FAIR SHARE PERCENTAGE			
		T (vph)	T _B (vph)	T _E (vph)	P (%)
12	Willow Street/Bellflower Boulevard	206	7329	5351	10.41%
16	Willow Street/Los Coyotes Diagonal	661	6474	4380	31.57%
17	Willow Street/Woodruff Avenue	162	4972	3414	10.40%
29	SR-22 WB Ramp/College Park Drive	253	2318	1557	33.25%
30	7th Street/Pacific Coast Highway	61	6998	6220	7.84%
31	7th Street/Bellflower Boulevard	177	7091	6045	16.92%
33	7th Street/Channel Drive	84	5407	4789	13.59%
34	7th Street/West Campus Drive	184	6154	5481	27.34%
35	7th Street/East Campus Drive	217	6739	5720	21.30%

ID #	Intersection	ALTERNATIVE 3 FAIR SHARE PERCENTAGE			
		T (vph)	T _B (vph)	T _E (vph)	P (%)
12	Willow Street/Bellflower Boulevard	206	7329	5351	10.41%
13	Los Coyotes Diagonal/Bellflower Boulevard	113	7246	5888	8.32%
16	Willow Street/Los Coyotes Diagonal	615	6428	4380	30.03%
30	7th Street/Pacific Coast Highway	63	7000	6220	8.08%
31	7th Street/Bellflower Boulevard	200	7103	5969	17.64%
33	7th Street/Channel Drive	87	5410	4789	14.01%
34	7th Street/West Campus Drive	255	5942	4923	25.02%
35	7th Street/East Campus Drive	64	6586	5720	7.39%

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**L5: Magnolia Street/Warner Avenue Interchange
with Auxiliary Lane and No Braided Ramps
Southbound – Alternative 3 LOS**

Comparison of Operations with and without the Southbound Braided Ramps at the Magnolia/Warner Interchange under Alternative 3				
	2020		2040	
	AM	PM	AM	PM
Unconstrained Mainline Freeway Volumes				
With Braided Ramps				
Ramp Junction: On-ramp from Magnolia Street	C	C	F	C
Ramp Junction: Off-ramp to Warner Avenue	E	E	F	E
Without Braided Ramps				
Weaving: Magnolia Street to Warner Avenue	D	C	E	D
Constrained Mainline Freeway Volumes				
With Braided Ramps				
Ramp Junction: On-ramp from Magnolia Street			C	C
Ramp Junction: Off-ramp to Warner Avenue			E	E
Without Braided Ramps				
Weaving: Magnolia Street to Warner Avenue			D	C
Intersection				
Southbound Ramps at Magnolia Street				
With Braided Ramps	A	B	B	C
Without Braided Ramps	A	B	A	B

Data with braided ramps are from the Traffic Study in Tables 2.5.3, 2.5.4, 2.5.5, 3.8.4, and 3.8.5.

1_SB405_WarnerMagnolia_2020Alt3NoBraid_AM.txt

HCS+: Freeway Weaving Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 9/22/2014
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: SB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2020 Alt 3
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF 70 mph
Weaving number of lanes, N 5
Weaving segment length, L 1257 ft
Terrain type Level
Grade %
Length mi
Weaving type B
Volume ratio, VR 0.16
Weaving ratio, R 0.33

Conversion to pc/h Under Base Conditions

	Non-weaving		weaving		
	V _{o1}	V _{o2}	V _{w1}	V _{w2}	
Volume, v	8096	0	1059	522	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v ₁₅	2131	0	279	137	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	8607	0	1125	554	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.66	0.29
Weaving and non-weaving speeds, S _i	51.22	61.60
Number of lanes required for unconstrained operation, N _w (Exhibit 24-7)		1.00
Maximum number of lanes, N _w (max) (Exhibit 24-7)		3.50
Type of operation is		Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

1_SB405_warnerMagnolia_2020Alt3NoBraid_AM.txt

Weaving segment speed, S	59.63	mph
Weaving segment density, D	34.50	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb	11746	pc/h
Capacity as a 15-minute flow rate, c	11630	pc/h
Capacity as a full-hour volume, ch	11048	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1679	4000	a
Average flow rate (pcphpl)	2057	2400	b
Volume ratio, VR	0.16	0.80	c
Weaving ratio, R	0.33	N/A	d
Weaving length (ft)	1257	2500	e

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.

1_SB405_warnerMagnolia_2020Alt3NoBraid_PM.txt

HCS+: Freeway Weaving Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 9/22/2014
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: SB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2020 Alt 3
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF 70 mph
Weaving number of lanes, N 5
Weaving segment length, L 1257 ft
Terrain type Level
Grade %
Length mi
Weaving type B
Volume ratio, VR 0.12
Weaving ratio, R 0.39

Conversion to pc/h Under Base Conditions

	Non-weaving		weaving		
	V _{o1}	V _{o2}	V _{w1}	V _{w2}	
Volume, v	6734	0	574	363	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v ₁₅	1772	0	151	96	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	7159	0	610	385	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.52	0.18
Weaving and non-weaving speeds, S _i	54.59	65.69
Number of lanes required for unconstrained operation, N _w (Exhibit 24-7)		0.79
Maximum number of lanes, N _w (max) (Exhibit 24-7)		3.50
Type of operation is		Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

1_SB405_warnerMagnolia_2020Alt3NoBraid_PM.txt

Weaving segment speed, S	64.10	mph
Weaving segment density, D	25.44	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	11830	pc/h
Capacity as a 15-minute flow rate, c	11713	pc/h
Capacity as a full-hour volume, ch	11127	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	995	4000	a
Average flow rate (pcphpl)	1630	2400	b
Volume ratio, VR	0.12	0.80	c
Weaving ratio, R	0.39	N/A	d
Weaving length (ft)	1257	2500	e

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.

1_SB405_warnerMagnolia_2040Alt3NoBraid_AMunconst.txt

HCS+: Freeway Weaving Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 9/22/2014
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: SB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2040 Alt 3 UnConstrained
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1257	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	B	
Volume ratio, VR	0.16	
Weaving ratio, R	0.38	

Conversion to pc/h Under Base Conditions

	Non-weaving		weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, v	9422	0	1102	690	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	2479	0	290	182	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	10017	0	1171	733	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.33
Weaving and non-weaving speeds, Si	49.82	60.21
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)		0.99
Maximum number of lanes, Nw (max) (Exhibit 24-7)		3.50
Type of operation is		Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

1_SB405_warnerMagnolia_2040Alt3NoBraid_AMunconst.txt

Weaving segment speed, S	58.27	mph
Weaving segment density, D	40.92	pc/mi/ln
Level of service, LOS	E	
Capacity of base condition, cb	11753	pc/h
Capacity as a 15-minute flow rate, c	11637	pc/h
Capacity as a full-hour volume, ch	11055	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1904	4000	a
Average flow rate (pcphpl)	2384	2400	b
Volume ratio, VR	0.16	0.80	c
Weaving ratio, R	0.38	N/A	d
Weaving length (ft)	1257	2500	e

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.

1_SB405_warnerMagnolia_2040Alt3NoBraid_Pmunconst.txt

HCS+: Freeway Weaving Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 9/22/2014
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: SB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2040 Alt 3 UnConstrained
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF 70 mph
Weaving number of lanes, N 5
Weaving segment length, L 1257 ft
Terrain type Level
Grade %
Length mi
Weaving type B
Volume ratio, VR 0.11
Weaving ratio, R 0.39

Conversion to pc/h Under Base Conditions

	Non-weaving		weaving		
	V _{o1}	V _{o2}	V _{w1}	V _{w2}	
Volume, v	7979	0	597	378	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	2100	0	157	99	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	8482	0	634	401	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.56	0.20
Weaving and non-weaving speeds, S _i	53.48	65.02
Number of lanes required for unconstrained operation, N _w (Exhibit 24-7)		0.70
Maximum number of lanes, N _w (max) (Exhibit 24-7)		3.50
Type of operation is		Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

1_SB405_warnerMagnolia_2040Alt3NoBraid_Pmunconst.txt

Weaving segment speed, S	63.53	mph
Weaving segment density, D	29.96	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb	11857	pc/h
Capacity as a 15-minute flow rate, c	11740	pc/h
Capacity as a full-hour volume, ch	11153	pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1035	4000	a
Average flow rate (pcphpl)	1903	2400	b
Volume ratio, VR	0.11	0.80	c
Weaving ratio, R	0.39	N/A	d
Weaving length (ft)	1257	2500	e

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.

1_SB405_warnerMagnolia_2040Alt3NoBraid_AMconst.txt

HCS+: Freeway Weaving Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 9/22/2014
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: SB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2040 Alt 3 Constrained
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1257	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	B	
Volume ratio, VR	0.21	
Weaving ratio, R	0.38	

Conversion to pc/h Under Base Conditions

	Non-weaving		weaving		
	V _{o1}	V _{o2}	V _{w1}	V _{w2}	
Volume, v	6710	0	1102	690	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v ₁₅	1766	0	290	182	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	7133	0	1171	733	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.65	0.32
Weaving and non-weaving speeds, S _i	51.26	60.42
Number of lanes required for unconstrained operation, N _w (Exhibit 24-7)		1.28
Maximum number of lanes, N _w (max) (Exhibit 24-7)		3.50
Type of operation is		Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

1_SB405_warnerMagnolia_2040Alt3NoBraid_AMconst.txt

Weaving segment speed, S	58.23	mph
Weaving segment density, D	31.04	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb	11615	pc/h
Capacity as a 15-minute flow rate, c	11500	pc/h
Capacity as a full-hour volume, ch	10925	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1904	4000	a
Average flow rate (pcphpl)	1807	2400	b
Volume ratio, VR	0.21	0.80	c
Weaving ratio, R	0.38	N/A	d
Weaving length (ft)	1257	2500	e

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.

1_SB405_warnerMagnolia_2040Alt3NoBraid_PMconst.txt

HCS+: Freeway Weaving Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 9/22/2014
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: SB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2040 Alt 3 Constrained
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF 70 mph
Weaving number of lanes, N 5
Weaving segment length, L 1257 ft
Terrain type Level
Grade %
Length mi
Weaving type B
Volume ratio, VR 0.13
Weaving ratio, R 0.39

Conversion to pc/h Under Base Conditions

	Non-weaving		weaving		
	V _{o1}	V _{o2}	V _{w1}	V _{w2}	
Volume, v	6803	0	597	378	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v ₁₅	1790	0	157	99	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	7232	0	634	401	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.52	0.19
Weaving and non-weaving speeds, S _i	54.38	65.45
Number of lanes required for unconstrained operation, N _w (Exhibit 24-7)		0.80
Maximum number of lanes, N _w (max) (Exhibit 24-7)		3.50
Type of operation is		Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

1_SB405_warnerMagnolia_2040Alt3NoBraid_PMconst.txt

Weaving segment speed, S	63.82	mph
Weaving segment density, D	25.91	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	11823	pc/h
Capacity as a 15-minute flow rate, c	11706	pc/h
Capacity as a full-hour volume, ch	11121	pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1035	4000	a
Average flow rate (pcphpl)	1653	2400	b
Volume ratio, VR	0.13	0.80	c
Weaving ratio, R	0.39	N/A	d
Weaving length (ft)	1257	2500	e

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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**L6: Magnolia Street/Warner Avenue Interchange
with C-D Road and No Braided Ramps
Northbound – Build Alternatives LOS**

Comparison of Operations with and without the Northbound Braided Ramps at the Magnolia/Warner Interchange Build Alternatives				
	2020		2040	
	AM	PM	AM	PM
Unconstrained Mainline Freeway Volumes				
With Braided Ramps				
Ramp Junction: Off-ramp to Warner Ave	E	F	F	F
Ramp Junction: Off-ramp to CD Road/Magnolia St	D	E	E	F
Without Braided Ramps				
Ramp Junction: Off-ramp to Warner Ave	E	F	F	F
Ramp Junction: Off-ramp to CD Road/Magnolia St	D	E	E	F
Weaving: Magnolia Street to Warner Avenue	B	D	B	D
Constrained Mainline Freeway Volumes				
With Braided Ramps				
Ramp Junction: Off-ramp to Warner Ave			E	E
Ramp Junction: Off-ramp to CD Road/Magnolia St			D	E
Without Braided Ramps				
Ramp Junction: Off-ramp to Warner Ave			E	E
Ramp Junction: Off-ramp to CD Road/Magnolia St			D	E
Weaving: Magnolia Street to Warner Avenue			B	D

Data with braided ramps are from the Traffic Study in Tables 2.5.3, 2.5.4 and 2.5.5.

1_NB405_warnerMagnolia_AM_2020 Alt 3_40mph.txt

HCS+: Freeway Weaving Release 5.4

Phone: Fax:
 E-mail:

Operational Analysis

Analyst: RL
 Agency/Co.: Parsons
 Date Performed: 8/15/2012
 Analysis Time Period: AM Peak Hour
 Freeway/Dir of Travel: NB I-405
 Weaving Location: Warner/Magnolia
 Jurisdiction: Caltrans - Orange County
 Analysis Year: 2020 Alt 3 Modified
 Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF 40 mph
 Weaving number of lanes, N 2
 Weaving segment length, L 860 ft
 Terrain type Level
 Grade %
 Length mi
 Weaving type B
 Volume ratio, VR 1.00
 Weaving ratio, R 0.31

Conversion to pc/h Under Base Conditions

	Non-weaving		Weaving		
	V o1	V o2	V w1	V w2	
Volume, V	0	0	534	236	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	0	141	62	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fp	1.00	1.00	1.00	1.00	
Flow rate, v	0	0	567	250	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.84	1.78
Weaving and non-weaving speeds, si	31.28	25.78
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)		2.32
Maximum number of lanes, Nw (max) (Exhibit 24-7)		3.50

1_NB405_warnerMagnolia_AM_2020 Alt 3_40mph.txt
Type of operation is Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	31.28	mph
Weaving segment density, D	13.06	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb		pc/h
Capacity as a 15-minute flow rate, c		pc/h
Capacity as a full-hour volume, ch		pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded Maximum	See Note
Weaving flow rate, Vw	817	4000	a
Average flow rate (pcphpl)	408		b
Volume ratio, VR	1.00	0.80	c
Weaving ratio, R	0.31	N/A	d
Weaving length (ft)	860	2500	e

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.

1_NB405_warnerMagnolia_PM_2020 Alt 3_40mph.txt

HCS+: Freeway Weaving Release 5.4

Phone: Fax:
 E-mail:

Operational Analysis

Analyst: RL
 Agency/Co.: Parsons
 Date Performed: 8/15/2012
 Analysis Time Period: PM Peak Hour
 Freeway/Dir of Travel: NB I-405
 Weaving Location: Warner/Magnolia
 Jurisdiction: Caltrans - Orange County
 Analysis Year: 2020 Alt 3 Modified
 Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF	40	mph
Weaving number of lanes, N	2	
Weaving segment length, L	860	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	B	
Volume ratio, VR	1.00	
Weaving ratio, R	0.44	

Conversion to pc/h Under Base Conditions

	Non-weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	0	0	856	673	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	0	225	177	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	0	910	715	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	1.36	3.55
Weaving and non-weaving speeds, si	27.69	21.60
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)		2.34
Maximum number of lanes, Nw (max) (Exhibit 24-7)		3.50

1_NB405_warnerMagnolia_PM_2020 Alt 3_40mph.txt
 Type of operation is Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	27.69	mph
Weaving segment density, D	29.35	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb		pc/h
Capacity as a 15-minute flow rate, c		pc/h
Capacity as a full-hour volume, ch		pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded Maximum	See Note
Weaving flow rate, Vw	1625	4000	a
Average flow rate (pcphpl)	812		b
Volume ratio, VR	1.00	0.80	c
Weaving ratio, R	0.44	N/A	d
Weaving length (ft)	860	2500	e

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.

1_NB405_warnerMagnolia_AM_2040 Alt 3_40mph.txt

HCS+: Freeway Weaving Release 5.4

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 8/15/2012
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: NB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2040 Alt 3 Modified
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF	40	mph
Weaving number of lanes, N	2	
Weaving segment length, L	860	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	B	
Volume ratio, VR	1.00	
Weaving ratio, R	0.32	

Conversion to pc/h Under Base Conditions

	Non-weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	0	0	556	259	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	0	146	68	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fp	1.00	1.00	1.00	1.00	
Flow rate, v	0	0	591	275	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	0.88	1.89
Weaving and non-weaving speeds, si	30.97	25.38
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)		2.32
Maximum number of lanes, Nw (max) (Exhibit 24-7)		3.50

1_NB405_warnerMagnolia_AM_2040 Alt 3_40mph.txt
 Type of operation is Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	30.97	mph
Weaving segment density, D	13.98	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb		pc/h
Capacity as a 15-minute flow rate, c		pc/h
Capacity as a full-hour volume, ch		pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded Maximum	See Note
Weaving flow rate, Vw	866	4000	a
Average flow rate (pcphpl)	433		b
Volume ratio, VR	1.00	0.80	c
Weaving ratio, R	0.32	N/A	d
Weaving length (ft)	860	2500	e

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.

1_NB405_warnerMagnolia_PM_2040 Alt 3_40mph.txt

HCS+: Freeway Weaving Release 5.4

Phone: Fax:
E-mail:

Operational Analysis

Analyst: RL
Agency/Co.: Parsons
Date Performed: 8/15/2012
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: NB I-405
Weaving Location: Warner/Magnolia
Jurisdiction: Caltrans - Orange County
Analysis Year: 2040 Alt 3 Modified
Description: I-405 PAED Improvement Project

Inputs

Freeway free-flow speed, SFF	40	mph
Weaving number of lanes, N	2	
Weaving segment length, L	860	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	B	
Volume ratio, VR	1.00	
Weaving ratio, R	0.47	

Conversion to pc/h Under Base Conditions

	Non-weaving		Weaving		
	V	V	V	V	
	o1	o2	w1	w2	
Volume, V	0	0	888	777	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	0	234	204	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	0	944	826	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
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	1.45	3.86
Weaving and non-weaving speeds, si	27.25	21.17
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)		2.34
Maximum number of lanes, Nw (max) (Exhibit 24-7)		3.50

1_NB405_warnerMagnolia_PM_2040 Alt 3_40mph.txt
 Type of operation is Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	27.25	mph
Weaving segment density, D	32.48	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb		pc/h
Capacity as a 15-minute flow rate, c		pc/h
Capacity as a full-hour volume, ch		pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded Maximum	See Note
Weaving flow rate, Vw	1770	4000	a
Average flow rate (pcphpl)	885		b
Volume ratio, VR	1.00	0.80	c
Weaving ratio, R	0.47	N/A	d
Weaving length (ft)	860	2500	e

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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