APPENDIX A: BIKE-TRANSIT HUB LIST

BIKE-TRANSIT HUB EVALUATION

As part of the Bicycle Transportation Strategic Plan (BTSP), Metro identified over 167 bike-transit hubs in Los Angeles County. A detailed summary of each location is shown in Table A-1, including transit activity, demographics, and an overall raw score that indicates general levels of existing or potential bicycling activity.

A description of the criteria used in the table is provided below.

Hub Number

Each hub is numbered in a series related to the transit line location.

Line

Metro line or transfer location

Hub Name

Location of bike-transit hub

Sub-region

Metro sub-region (C = Central, SFV = San Fernando Valley, NC = North County, etc.)

Transit Ridership

Number of persons using transit within three miles of the hub, based on U.S. Census Journey-to-Work, 2000.

Population

Population within three miles of the hub, based on U.S. Census, 2000.

Employment

Employment within three miles of the hub, based on the U.S. Census, 2000.

Household Income

Household income within three miles of the hub, based on U.S. Census, 2000.

Service

Number of transit and rail lines serving the hub.

The columns with normalized scores convert the raw data from the previous columns into a score. For example, the highest number of transit lines (service) serving any hub was nine. Each hub was scored between one and five, based on the possible range of lines between zero and nine. A hub with eight lines would score 4.44 out of five possible points. Each factor is then weighted according to its estimated importance, from five to 25. For a hub with a 4.44 service score, this would translate into a raw score of 22.2 (5 x 4.44). The row is added up for each criteria and a raw score is presented in the final column. This indicates the general level of potential activity at a bike-transit hub. A low score indicates a relatively low level of potential bicycling and transit activity, while a high score indicates a relatively high level of bicycling and transit activity.

Table A-1 – Bike-Transit Hub List

				59451	269915	142273	76992	9	5.00	5.00	5	5.00	5.00	5.00	359
		Highest number in category													
		Weighting factor							10	25	5	25	15	25	
Hub	Line	Hub Name	Subregion	Transit Ridership <3 miles	Population_3mi	Employment_3mi	HH_Income_3mi	Service_TOTAL	Normalized_Service	Normalized_Ridership	Normalized_Terminus	Normalized_Population	Normalized_Employment	Normalized_HH_Income	SCORE_RAW
100	**UNION**	**Union Station**													
101	UNION	Union Station	C	34210	53211	17302	25110	8	4.44	2.88	0	0.99	0.61	3.37	234
200	**RED**	**Metro Red Line**													
201	RED	Civic Center	C	41520	61809	23795	24064	7	3.89	3.49	0	1.14	0.84	3.44	253
202	RED	Pershing Square	C	44812	60972	23449	23104	7	3.89	3.77	0	1.13	0.82	3.50	261
203	RED	7th / Metro Center	C	49087	60106	24047	23027	5	2.78	4.13	0	1.11	0.85	3.50	259
204	RED	Westlake / MacArthur Park	C	55321	70053	39793	24971	7	3.89	4.65	0	1.30	1.40	3.38	293
205	RED	Wilshire/Vermont	C	58514	78092	49737	26345	7	3.89	4.92	0	1.45	1.75	3.29	307
206	RED	Wilshire/Normandie	C	59451	78636	50115	26538	7	3.89	5.00	0	1.46	1.76	3.28	309
207	RED	Wilshire/Western	C	58916	56656	51987	27153	7	3.89	4.95	5	1.05	1.83	3.24	322
208	RED	Vermont/Beverly	C	56058	68539	47716	27441	7	3.89	4.71	0	1.27	1.68	3.22	294
209	RED	Vermont/Santa Monica	C	48831	38017	44174	28939	7	3.89	4.11	0	0.70	1.55	3.12	260
210	RED	Vermont/Sunset	C	38569	36895	42296	29467	7	3.89	3.24	0	0.68	1.49	3.09	237
211	RED	Hollywood/Western	C	27320	36127	46535	33059	5	2.78	2.30	0	0.67	1.64	2.85	198
212	RED	Hollywood/Vine	C	22919	70717	76350	44223	7	3.89	1.93	0	1.31	2.68	2.13	213
213	RED	Hollywood/Highland	C	17513	45142	53316	39747	5	2.78	1.47	0	0.84	1.87	2.42	174
214	RED	Universal City	SFV/NC	3703	38688	54658	50122	7	3.89	0.31	0	0.72	1.92	1.75	137
215	RED	North Hollywood	SFV/NC	6133	51128	59483	43888	6	3.33	0.52	5	0.95	2.09	2.15	180
300	**BLUE**	**Metro Blue Line**													
301	BLUE	Pico	C	51985	59359	27153	22819	5	2.78	4.37	0	1.10	0.95	3.52	267
302	BLUE	Grand	C	50386	59932	28012	22659	5	2.78	4.24	0	1.11	0.98	3.53	264
303	BLUE	San Pedro	C	40396	57041	22872	22268	5	2.78	3.40	0	1.06	0.80	3.55	240
304	BLUE	Washington	C	27553	58649	21733	22742	5	2.78	2.32	0	1.09	0.76	3.52	212
305	BLUE	Vernon	C	22395	30425	21895	24149	7	3.89	1.88	0	0.56	0.77	3.43	197

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		Weighting factor							10	25	5	25	15	25	
Hub	Line	Hub Name	Subregion	Transit Ridership <3 miles	Population_3mi	Employment_3mi	HH_Income_3mi	Service_TOTAL	Normalized_Service	Normalized_Ridership	Normalized_Terminus	Normalized_Population	Normalized_Employment	Normalized_HH_Income	SCORE_RAW
306	BLUE	Slauson	C	22713	53004	16808	25251	5	2.78	1.91	0	0.98	0.59	3.36	193
307	BLUE	Florence	GW	21317	22653	33029	26236	5	2.78	1.79	0	0.42	1.16	3.30	183
308	BLUE	Firestone	GW	17892	28875	34136	27033	5	2.78	1.50	0	0.53	1.20	3.24	178
309	BLUE	103rd St. / Kenneth Hahn	GW	14372	24874	34199	28408	5	2.78	1.21	0	0.46	1.20	3.16	166
310	BLUE	Imperial/ Wilmington / Rosa Parks	GW	10689	22904	28610	30464	5	2.78	0.90	0	0.42	1.01	3.02	151
311	BLUE	Compton	GW	5912	22257	18658	34378	6	3.33	0.50	0	0.41	0.66	2.77	135
312	BLUE	Artesia	GW	5114	22324	18194	37049	5	2.78	0.43	0	0.41	0.64	2.59	123
313	BLUE	Del Amo	GW	3544	26586	22530	42734	5	2.78	0.30	0	0.49	0.79	2.22	115
314	BLUE	Wardlow	GW	6094	43098	45408	35135	5	2.78	0.51	0	0.80	1.60	2.72	152
315	BLUE	Willow	GW	9533	63964	68427	34288	5	2.78	0.80	0	1.18	2.40	2.77	183
316	BLUE	Pacific Coast Highway	GW	9592	44828	57126	32917	5	2.78	0.81	0	0.83	2.01	2.86	170
317	BLUE	Anaheim	GW	9370	111705	107476		5	2.78	0.79	0	2.07	3.78	5.00	281
318	BLUE	5th Street	GW	9013	40309	52036	31126	5	2.78	0.76	0	0.75	1.83	2.98	167
319	BLUE	1st Street	GW	8841	89835	94810		5	2.78	0.74	0	1.66	3.33	5.00	263
320	BLUE	Long Beach Transit Mall	GW	8787	43649	52752	31149	6	3.33	0.74	5	0.81	1.85	2.98	199
321	BLUE	Pacific	GW	8922	41019	53210	30633	5	2.78	0.75	0	0.76	1.87	3.01	169
400	GREEN	Metro Green Line													
401	GREEN	I-605/I-105 Norwalk	GW	3263	71188	60525	46012	7	3.89	0.27	5	1.32	2.13	2.01	186
402	GREEN	Lakewood	GW	3812	54282	51160	42532	5	2.78	0.32	0	1.01	1.80	2.24	144
403	GREEN	Long Beach (Blvd)	GW	8967	29121	25992	33182	5	2.78	0.75	0	0.54	0.91	2.85	145
404	GREEN	Avalon	GW	10150	24513	30494	28693	5	2.78	0.85	0	0.45	1.07	3.14	155
405	GREEN	Harbor Freeway	GW	9650	27321	31700	29561	7	3.89	0.81	0	0.51	1.11	3.08	166
406	GREEN	Vermont	SB	9541	25005	29457	30226	7	3.89	0.80	0	0.46	1.04	3.04	162
407	GREEN	Crenshaw	SB	9577	52418	37278	34869	7	3.89	0.81	0	0.97	1.31	2.74	171
408	GREEN	Hawthorne	SB	7754	42464	32933	38005	5	2.78	0.65	0	0.79	1.16	2.53	144
409	GREEN	Aviation	SB	5783	41460	29091	45165	7	3.89	0.49	0	0.77	1.02	2.07	137

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		Weighting factor							10	25	5	25	15	25	
Hub	Line	Hub Name	Subregion	Transit Ridership <3 miles	Population_3mi	Employment_3mi	HH_Income_3mi	Service_TOTAL	Normalized_Service	Normalized_Ridership	Normalized_Terminus	Normalized_Population	Normalized_Employment	Normalized_HH_Income	SCORE_RAW
410	GREEN	Mariposa	SB	4481	37219	27046	49559	5	2.78	0.38	0	0.69	0.95	1.78	113
411	GREEN	El Segundo	SB	4244	37621	28080	50361	5	2.78	0.36	0	0.70	0.99	1.73	112
412	GREEN	Douglas	SB	4190	39266	34914	53740	5	2.78	0.35	0	0.73	1.23	1.51	111
413	GREEN	Redondo Beach	SB	4512	192371	114621		5	2.78	0.38	5	3.56	4.03	5.00	337
500	GOLD	Metro Gold Line													
501	GOLD	Chinatown	C	32107	53139	17103	26303	5	2.78	2.70	5	0.98	0.60	3.29	236
502	GOLD	Lincoln / Cypress	C	17134	37853	19927	30702	7	3.89	1.44	0	0.70	0.70	3.01	178
503	GOLD	Heritage Square	C	13910	25070	17645	33920	5	2.78	1.17	0	0.46	0.62	2.80	148
504	GOLD	Southwest Musuem	C	9869	11590	17596	38259	5	2.78	0.83	0	0.21	0.62	2.52	126
505	GOLD	Highland Park	C	8428	12027	18243	42691	5	2.78	0.71	0	0.22	0.64	2.23	116
506	GOLD	Mission	SGV	6337	35528	29486	47048	5	2.78	0.53	0	0.66	1.04	1.94	122
507	GOLD	Fillmore	SGV	5005	30844	29877	49904	5	2.78	0.42	0	0.57	1.05	1.76	112
508	GOLD	Del Mar	SGV	4047	27957	25845	53008	5	2.78	0.34	0	0.52	0.91	1.56	102
509	GOLD	Memorial Park	SGV	3784	28100	26370	56067	7	3.89	0.32	0	0.52	0.93	1.36	108
510	GOLD	Lake	SGV	3348	99839	86039	53740	5	2.78	0.28	0	1.85	3.02	1.51	164
511	GOLD	Allen	SGV	3321	32384	29557	59831	5	2.78	0.28	0	0.60	1.04	1.11	93
512	GOLD	Sierra Madre Villa	SGV	1811	24628	27694	60670	5	2.78	0.15	5	0.46	0.97	1.06	109
600	MLINK	Metrolink Commuter Rail													
601	MLINK	Glendale	AV	9913	60415	46692	39889	6	3.33	0.83	0	1.12	1.64	2.41	167
602	MLINK	Burbank	AV	2080	45302	39149	49911	6	3.33	0.17	0	0.84	1.38	1.76	123
603	MLINK	Burbank Airport	AV	5771	58782	57454	41619	6	3.33	0.49	0	1.09	2.02	2.30	160
604	MLINK	Van Nuys	SFV/NC	11962	100539	95771	36777	6	3.33	1.01	0	1.86	3.37	2.61	221
605	MLINK	Northridge	SFV/NC	4067	79958	76914	52544	6	3.33	0.34	0	1.48	2.70	1.59	159
606	MLINK	Chatsworth	SFV/NC	1700	42416	31769	61432	6	3.33	0.14	0	0.79	1.12	1.01	99
607	MLINK	Sun Valley	SFV/NC	4430	32483	29686	40397	6	3.33	0.37	0	0.60	1.04	2.38	133
608	MLINK	Sylmar/San Fernando	SFV/NC	3212	46693	50195	47888	6	3.33	0.27	0	0.86	1.76	1.89	135

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		Weighting factor							10	25	5	25	15	25	
Hub	Line	Hub Name	Subregion	Transit Ridership <3 miles	Population_3mi	Employment_3mi	HH_Income_3mi	Service_TOTAL	Normalized_Service	Normalized_Ridership	Normalized_Terminus	Normalized_Population	Normalized_Employment	Normalized_HH_Income	SCORE_RAW
609	MLINK	Cal State LA	C	12225	24198	27618	33697	6	3.33	1.03	0	0.45	0.97	2.81	155
610	MLINK	Montebello/Commerce	GW	5365	54789	35768	38094	6	3.33	0.45	0	1.01	1.26	2.53	152
611	MLINK	Commerce	GW	7433	49557	39378	35598	6	3.33	0.63	0	0.92	1.38	2.69	160
612	MLINK	Norwalk/Santa Fe Springs	GW	1927	55075	48140	50816	6	3.33	0.16	0	1.02	1.69	1.70	131
613	MLINK	Industry	SGV	1257	39346	34795	66475	6	3.33	0.11	0	0.73	1.22	0.68	90
614	MLINK	Downtown Pomona	SGV	2403	35322	37679	43374	6	3.33	0.20	0	0.65	1.32	2.18	129
615	MLINK	El Monte	SGV	4696	86269	62901	40932	6	3.33	0.39	0	1.60	2.21	2.34	175
616	MLINK	Baldwin Park	SGV	3011	47034	47795	46178	6	3.33	0.25	0	0.87	1.68	2.00	137
617	MLINK	Covina	SGV	2901	62072	64084	51639	6	3.33	0.24	0	1.15	2.25	1.65	143
618	MLINK	Pomona (North)	SGV	2453	37351	39789	48589	6	3.33	0.21	0	0.69	1.40	1.84	123
619	MLINK	Claremont	SGV	1653	25639	26785	48301	6	3.33	0.14	0	0.47	0.94	1.86	109
620	MLINK	Santa Clarita	SFV/NC	1392	14208	25782	71611	6	3.33	0.12	0	0.26	0.91	0.35	65
621	MLINK	Princessa	SFV/NC	769	6534	15182	63740	6	3.33	0.06	0	0.12	0.53	0.86	67
622	MLINK	Janheidt / Newhall	SFV/NC	919	10220	15626	71281	6	3.33	0.08	0	0.19	0.55	0.37	58
623	MLINK	Vincent Grade/Acton	SFV/NC	29	2048	8928	53322	6	3.33	0.00	0	0.04	0.31	1.54	77
624	MLINK	Lancaster	SFV/NC	734	32772	38124	40053	6	3.33	0.06	5	0.61	1.34	2.40	155
625	MLINK	Palmdale Transportation Center	SFV/NC	812	24750	29351	43659	6	3.33	0.07	0	0.46	1.03	2.16	116
700	TC	Busways / Transit Centers													
701	TC	Eastland Center	SGV	2519	38251	48469	39889	4	2.22	0.21	0	0.71	1.70	2.41	131
702	TC	Fox Hills Mall /Culver City TC	W	6591	45842	49747	49911	5	2.78	0.55	0	0.85	1.75	1.76	133
703	TC	El Monte	SGV	4852	93782	68180	41619	9	5.00	0.41	0	1.74	2.40	2.30	197
704	TC	Inglewood TC - North	SB	7545	94809	82939	36777	6	3.33	0.63	0	1.76	2.91	2.61	202
705	TC	Inglewood TC - South	SB	7515	94324	84916	52544	7	3.89	0.63	0	1.75	2.98	1.59	183
706	TC	CSULB Transit Hub / VA Hospital	GW	2375	46993	55926	61432	2	1.11	0.20	0	0.87	1.97	1.01	93
707	TC	USC Medical Center	C	15916	269915	90872	40397	4	2.22	1.34	0	5.00	3.19	2.38	288
708	TC	USC/Exposition Park/37th	C	40699	242682	142273	47888	7	3.89	3.42	0	4.50	5.00	1.89	359

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	Weighting factor								10	25	5	25	15	25	
Hub	Line	Hub Name	Subregion	Transit Ridership <3 miles	Population_3mi	Employment_3mi	HH_Income_3mi	Service_TOTAL	Normalized_Service	Normalized_Ridership	Normalized_Terminus	Normalized_Population	Normalized_Employment	Normalized_HH_Income	SCORE_RAW
709	TC	Artesia TC	GW	2459	45988	29703	33697	8	4.44	0.21	0	0.85	1.04	2.81	157
710	TC	Carson	SB	2107	52024	44555	38094	6	3.33	0.18	0	0.96	1.57	2.53	148
711	TC	LAX City Bus Center	SB	4634	45737	27888	35598	5	2.78	0.39	0	0.85	0.98	2.69	141
712	TC	Manchester	SB	17084	46592	85331	50816	6	3.33	1.44	0	0.86	3.00	1.70	178
713	TC	PCH	SB	2775	40205	49278	66475	6	3.33	0.23	0	0.74	1.73	0.68	101
714	TC	Pico Rimpau TC	C	32393	44386	56989	43374	5	2.78	2.72	0	0.82	2.00	2.18	201
715	TC	Rosecrans	GW	5764	68795	59341	40932	6	3.33	0.48	0	1.27	2.09	2.34	167
716	TC	Slauson	C	24744	101306	106545	46178	6	3.33	2.08	0	1.88	3.74	2.00	238
717	TC	West LA TC	W	11677	55160	52139	51639	5	2.78	0.98	0	1.02	1.83	1.65	147
718	TC	UCLA Ackerman Terminal	W	4463	99011	56250	48589	6	3.33	0.38	0	1.83	1.98	1.84	164
720	TC	UCLA Hilgard Terminal	W	4094	100121	55052	48301	2	1.11	0.34	0	1.85	1.93	1.86	142
721	TC	Cal Poly Pomona TC	SGV	996	27221	27947	71611	4	2.22	0.08	0	0.50	0.98	0.35	60
722	TC	South Bay Galleria	SB	3067	64285	60749	63740	6	3.33	0.26	0	1.19	2.13	0.86	123
723	TC	Santa Monica Transit Mall	W	3667	69735	66370	71281	7	3.89	0.31	0	1.29	2.33	0.37	123
724	TC	West Covina TC	SGV	3874	59637	66968	53322	4	2.22	0.33	0	1.10	2.35	1.54	132
800	ORANGE	Metro Orange "Rapidway" (Future)													
801	ORANGE	Laurel Canyon	SFV/NC	7603	52407	74358	42624	2	1.11	0.64	0	0.97	2.61	2.23	146
802	ORANGE	Valley College	SFV/NC	8942	53198	66178	41827	2	1.11	0.75	0	0.99	2.33	2.28	147
803	ORANGE	Woodman	SFV/NC	9702	51543	64662	41550	2	1.11	0.82	0	0.95	2.27	2.30	147
804	ORANGE	Van Nuys	SFV/NC	8879	51214	58206	42725	3	1.67	0.75	0	0.95	2.05	2.23	145
805	ORANGE	Sepulveda	SFV/NC	7818	47943	45906	43197	3	1.67	0.66	0	0.89	1.61	2.19	134
806	ORANGE	Woodley	SFV/NC	7719	45925	44062	46022	2	1.11	0.65	0	0.85	1.55	2.01	122
807	ORANGE	Balboa	SFV/NC	5871	44135	40499	52370	2	1.11	0.49	0	0.82	1.42	1.60	105
808	ORANGE	Reseda	SFV/NC	3415	46457	32773	51270	3	1.67	0.29	0	0.86	1.15	1.67	104
809	ORANGE	Tampa	SFV/NC	4301	60859	37242	51040	2	1.11	0.36	0	1.13	1.31	1.69	110
810	ORANGE	Pierce College	SFV/NC	4941	58045	45154	56130	2	1.11	0.42	0	1.08	1.59	1.35	106

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811	ORANGE	De Soto	SFV/NC	3969	58338	39915	63919	2	1.11	0.33	0	1.08	1.40	0.85	89
812	ORANGE	Warner Center	SFV/NC	2733	55258	36771		4	2.22	0.23	5	1.02	1.29	5.00	223
900	GOLD_X	Gold Line East LA extension													
901	GOLD_X	Little Tokyo	C	36806	54487	18135	24086	3	1.67	3.10	0	1.01	0.64	3.44	215
902	GOLD_X	Pico/Aliso	C	26600	53374	16025	25217	2	1.11	2.24	0	0.99	0.56	3.36	184
903	GOLD_X	Mariachi Plaza	C	20958	53351	15027	26003	2	1.11	1.76	0	0.99	0.53	3.31	171
904	GOLD_X	Soto	C	14254	48550	13317	27455	4	2.22	1.20	0	0.90	0.47	3.22	162
905	GOLD_X	Indiana	C	12465	33240	16256	29296	2	1.11	1.05	0	0.62	0.57	3.10	139
906	GOLD_X	Maravilla	C	11879	29402	23604	32349	2	1.11	1.00	0	0.54	0.83	2.90	135
907	GOLD_X	East LA Civic Center	C	10986	30065	23304	33035	2	1.11	0.92	0	0.56	0.82	2.85	132
908	GOLD_X	Eastside Gold Line Terminus	C	9138				3	1.67	0.77	5	0.00	0.00	5.00	186
1000	OTHER	Other Centers (Transfers)													
1001	OTHER	Santa Anita Mall	SGV	1788	55143	60845	57389	3	1.67	0.15	0	1.02	2.14	1.27	110
1002	OTHER	Bell Gardens	GW	7724	88694	61947	36112	5	2.78	0.65	0	1.64	2.18	2.65	184
1003	OTHER	Beverly Hills	W	6650	162532	99240	59824	4	2.22	0.56	0	3.01	3.49	1.11	192
1004	OTHER	Cal State Dominguez Hills	SB	2610	58448	32398	42198	3	1.67	0.22	0	1.08	1.14	2.26	123
1005	OTHER	Cerritos College	GW	2699	76255	71880	50054	3	1.67	0.23	0	1.41	2.53	1.75	139
1006	OTHER	Claremont Colleges	SGV	1110	27755	26687	53074	4	2.22	0.09	0	0.51	0.94	1.55	90
1007	OTHER	Compton	GW	5886	50080	42071	33916	5	2.78	0.50	0	0.93	1.48	2.80	155
1008	OTHER	Huntington Park	GW	16889	73362	78998	28591	5	2.78	1.42	0	1.36	2.78	3.14	217
1009	OTHER	Gateway	GW	10899	79622	72448	35224	5	2.78	0.92	0	1.47	2.55	2.71	194
1010	OTHER	Lakewood Mall	GW	2904	61207	64204	47286	4	2.22	0.24	0	1.13	2.26	1.93	139
1011	OTHER	Long Beach Airport	GW	3635	60619	66743	46934	3	1.67	0.31	0	1.12	2.35	1.95	136
1012	OTHER	San Pedro	SB	1164	23371	37707	51919	3	1.67	0.10	0	0.43	1.33	1.63	91
1013	OTHER	Venice/Marina Del Rey	W	3795	78470	69714	52519	4	2.22	0.32	0	1.45	2.45	1.59	143
1014	OTHER	Occidental College	C	8687	72738	95150	43603	4	2.22	0.73	0	1.35	3.34	2.17	179

		Highest number in category		59451	269915	142273	76992	9	5.00	5.00	5	5.00	5.00	5.00	359
		Weighting factor							10	25	5	25	15	25	
Hub	Line	Hub Name	Subregion	Transit Ridership <3 miles	Population_3mi	Employment_3mi	HH_Income_3mi	Service_TOTAL	Normalized_Service	Normalized_Ridership	Normalized_Terminus	Normalized_Population	Normalized_Employment	Normalized_HH_Income	SCORE_RAW
1015	OTHER	Studios	SFV/NC	3250	85431	62773	46321	3	1.67	0.27	0	1.58	2.21	1.99	146
1016	OTHER	Beverly Center	C	7939	119938	94424	56324	4	2.22	0.67	0	2.22	3.32	1.34	178
1017	OTHER	Park La Brea	C	14891	123288	113209	45549	4	2.22	1.25	0	2.28	3.98	2.04	221
1019	OTHER	Downtown Redondo Beach (Pier)	SB	548	56637	71746	72765	4	2.22	0.05	0	1.05	2.52	0.27	94
1020	OTHER	San Fernando	SFV/NC	961	50031	57949	46092	5	2.78	0.08	0	0.93	2.04	2.01	134
1021	OTHER	McBean Transfer Station	SFV/NC	3762	22149	37284	76992	3	1.67	0.32	0	0.41	1.31	0.00	54
1022	OTHER	West Hollywood - San Vicente	W	6010	111488	86580	61419	4	2.22	0.51	0	2.07	3.04	1.01	157
1023	OTHER	West Hollywood - Fairfax	W	10670	113613	99706	50657	4	2.22	0.90	0	2.10	3.50	1.71	193
1024	OTHER	West Hollywood - La Brea	W	20603	127217	129696	40134	4	2.22	1.73	0	2.36	4.56	2.39	253
1025	OTHER	Downtown Whittier	SGV	1498	52571	49256	50968	3	1.67	0.13	0	0.97	1.73	1.69	112
1100	EXPO	Exposition Line (Future)													
1102	EXPO	Vermont	C	41494	206309	119167	23662	4	2.22	3.49	0	3.82	4.19	3.46	354
1103	EXPO	Western	C	35351	116266	112041	25826	3	1.67	2.97	0	2.15	3.94	3.32	287
1104	EXPO	Crenshaw	C	20423	56813	74675	31731	3	1.67	1.72	0	1.05	2.62	2.94	199
1105	EXPO	La Brea	C	13908	46050	61920	40041	2	1.11	1.17	0	0.85	2.18	2.40	154
1106	EXPO	La Cienega	W	10809	46207	55977	45233	4	2.22	0.91	0	0.86	1.97	2.06	147
1107	EXPO	Venice/Washington	W	10092	59688	55567	49244	3	1.67	0.85	5	1.11	1.95	1.80	165
1108	EXPO	Venice/Overland	C	7858	60385	51600		1	0.56	0.66	0	1.12	1.81	5.00	202
1109	EXPO	Venice/Sepulveda	C	7865	58952	49568		1	0.56	0.66	0	1.09	1.74	5.00	201
1110	EXPO	Sepulveda/National	W	9906	91844	64649		1	0.56	0.83	0	1.70	2.27	5.00	228
1111	EXPO	Pico/Sawtelle	W	9503	82591	63171		1	0.56	0.80	0	1.53	2.22	5.00	222
1112	EXPO	Bundy	W	9336	108213	77360		1	0.56	0.79	0	2.00	2.72	5.00	241
1113	EXPO	Cloverfield	W	6856	84600	67871		1	0.56	0.58	0	1.57	2.39	5.00	220
1114	EXPO	Ocean/Colorado	W	3737	51916	45654		1	0.56	0.31	5	0.96	1.60	5.00	212

APPENDIX B: HOW TO CONDUCT A BIKE-TRANSIT AUDIT

CONDUCTING BIKE-TRANSIT AUDITS

As part of the BTSP process, Metro consultants conducted Bike-Transit Audits of 12 selected locations in Los Angeles County. The process included intensive field review by an experienced bikeway planner, followed by a meeting between the local agency, Metro, and the auditor to discuss the findings. The worksheets from this effort are shown in this Appendix. The Audit process was developed to be usable by local agencies to create their own Access Plan. A reproducible version of the Audit worksheet is available at the end of this Appendix.

Requirements

In order to conduct a Bike-Transit Audit, the following minimum requirements must be met:

1. (Auditor) Licensed traffic engineer or transportation planning professional with experience and qualifications in analyzing roadways, traffic conditions, and safety conditions.
2. (Auditor) Working knowledge of bikeway planning, including AASHTO Guide for the Development of Bicycle Facilities, Caltrans Highway Design Manual, Chapter 1000: Bikeway Planning and Design, and MUTCD 2003, California Supplement: Part 9: Traffic Controls for Bicycles.
3. Blank Audit worksheets.
4. Maps and/or aerial photographs of the study area (typically 1,500 feet radius around the hub) at a scale of 1" = 200' or less.
5. Where available, local agency (city or county) bicycle route maps, or bicycle route network planning maps.

Audit Process

Using the worksheet, follow this process:

1. Identify and highlight the bicycle access routes based on a combination of (a) existing and planned bikeway routes, (b) input from the bicycling community, and (c) local knowledge of routes that provide reasonable access for bicycles in all directions.
2. Number each route segment.
3. Record the field review date, time, street name, compass direction facing, 'from and to' limits, and length of segment in feet. Segment length can be scaled from a map or aerial photograph; it need not be measured in the field.
4. Record the width information (pavement width). This can be done in the field, or from maps if they are available.
5. Record street classification (arterial, collector, local), existing bikeway class (if any, I=bike path, II=bike lanes, III=bike route), posted speed, actual speed (from speed surveys if available, or estimated in the field), average daily traffic (ADT), pavement quality (good, average, poor), and grade (none, low =0-5%, moderate =5-10%, steep = over 10%).
6. The next section provides a 'snapshot' of the public right-of-way cross-section. This should be done as often as needed to show right-of-way conditions across the street from left to right, relative to the "facing" (compass) direction recorded earlier. A description of each item is shown below:

Land use (C=Commercial retail or service, O=Office, R=Residential, P=Public, I=Industrial, V=Vacant, RR=Railroad or rail right-of-way, PARK=Park or open space)

Curb type = (C=curb, R=rolled curb, 0=no curb)

W. gutter pan = width of gutter pan

Parking type = (P=on-street parking, NP=no parking, ST-=short term, LT=long term)

W. shoulder or bike lane = width of shoulder or bike lane

W. lanes = width of lanes

Once field data has been collected on the worksheet and on marked-up maps, an analysis of potential improvements can be made. Typically, the evaluation process follows this sequence:

1. Does the access route appear to be a likely route used by bicyclists accessing the transit hub?
2. Were any specific safety or other hazards or problems observed on the segment?
3. Given traffic volumes and speeds, is additional bicycle travel width needed in the form of a bike lane or wide outside curb lane?
4. Can the road be re-striped to provide bike lanes or wide outside curb lanes (at least 14 feet in width; 15 feet where there is heavy bus or truck traffic)?
5. Can the road be easily widened?
6. Is the on-street parking used during peak periods (over 50% occupied)?
7. Can the travel lanes be narrowed down to 10.5 feet based on traffic volumes, speeds, and mix of trucks and buses?
8. Can the number of travel and turn lanes be reduced based on traffic and turning movement volumes?
9. Is the two-way left turn lane justified based on turning movements? Could the two-way left turn lane be replaced with a narrow raised median combined with U-turns at major intersections?
10. Can traffic speeds be reduced through physical measures (curb extensions, timed signals, etc.) or increased enforcement?
11. Does the intersection provide a place for through bicyclists to wait for a signal? Or are bicyclists pinned against the curb? Are there heavy unrestricted right turn volumes?
12. Is there a bicycle signal detector and adequate green clearance time at the signalized intersections?
13. Is there adequate access to the transit center, including curb cuts and wheel channels on stairways, and (where applicable) crosswalks and pedestrian buttons for crossing perimeter streets?
14. Is the bicycle parking adequate in terms of capacity, security, and access?

Corridor, intersection, and bike parking improvements will evolve out of these and other questions. It is recommended that the professional conducting the analysis take one of several classes taught by Caltrans, the Institute of Transportation Studies (ITS), and other organizations to learn techniques and case studies for various improvements.

PROJECT DEVELOPMENT PROCESS

Once an audit has been completed, it can be used, along with the data in Table 1 and Table A-1, to develop a Bike-Transit Access Plan. The Access Plan can be used to generate cost estimates, garner political and public support, and to pursue funding. The typical sequence of project development from completion of a Bike-Transit Access Plan onwards is shown below, and shows how an audit fits into this process.

1. Problem Recognition. Through the Bike-Transit Audit process and completion of an Access Plan, existing problems and potential improvements are identified. The Plan is used to generate political, public, and department support.
2. Project Definition. Problems and potential improvements identified by local agencies through the Audit and Access Plan process will need to define and package the project so that it will be competitive. The project may be defined as a 'bike-transit,' corridor, streetscape, safety, traffic-calming, or transit project.
3. Feasibility Study. Once a sponsor defines a project, resources need to be allocated to perform an initial analysis of the project so that the full extent of conditions, needs, and costs can be identified. For larger projects, this could be a formal feasibility study (also known as preliminary engineering). This study will indicate right-of-way needs, preferred alignments or designs, safety analysis, traffic analysis, costs, needs, phasing, standards, and other information.
4. Funding. The feasibility study will help develop reasonably accurate costs for the project, which can then be used to obtain funding. The funding could come from a variety of sources ranging from local General Funds to competitive grants, Call for Projects, Capital Improvement Program budget, or earmarks.

5. Final Design. Once a project obtains funding, it moves into final design. This is likely to include engineering (civil, traffic), landscape architecture, urban design, and other specialties. This effort often also includes obtaining environmental, encroachment, and other permits associated with the project, along with any needed easements and management agreements.
6. Construction. The final effort is the construction of a project.

Metro Bicycle Transportation Strategic Plan

Bike-Transit Hub / Activity Center Audit

Updated 8 June 2005

HUB (information from hub table)

ID		Group	
Name			
Intersection			
City			
Audit date			
By			

BICYCLE PARKING (at hub. R=rack, L=locker)

Run	R/L	Type	Bikes	Replace	Notes
1					
2					
3					
4					
5					
6					

INTERSECTIONS (only on existing or potential bike routes)

Int #	Street1	Street2	Toolbox	Notes
1				
2				
3				
4				
5				
6				
7				
8				

STREET SEGMENTS

Survey | Roadway | Left (N or E) side | Median | Right (S or W) side | Improvements

Seg #	Date	Time	Street	Facing compass direction	From	To	Length, ft (from map)	W paved	W incl. sidewalks	Street classification	Exist. bikeway class	Posted speed	Actual speed	ADT	Pavement Quality	Grade	Land Use	W, Sidewalk	W, Landscape	Curb Type	W, Gutter pan	Parkikng type	W, Shoulder or Bike Lane	W, lanes	W, island or turn lane(s)	(R)aised / (P)ainted?	W, lanes	W, Shoulder or Bike Lane	Parking	W, Gutter pan	Curb Type	W, Landscape	W, Sidewalk	Land Use	Toolbox	Notes
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*This table is available from Metro.

APPENDIX C: TOOLBOX OF BICYCLE FACILITY DESIGN MEASURES

TOOLBOX OF MEASURES

This section discusses design measures or improvements typically used in bicycle environments. The Bike-Transit Hub Access Plans in Section 3 recommend types of measures that can be implemented around transit hubs to increase bicycle access and ridership. This toolbox, and the Pedestrian and Bicycle Facilities in California: Technical Reference Guide, is not intended to replace sound engineering practices or to supplant MUTCD and 2003 California Supplement, Caltrans Highway Design Manual Chapter 1000, or AASHTO standards or guidance.

Table A-2 – Toolbox of Design Measures

Measure	Purpose	Where to Use	Caltrans Standard	Page No.
Bicycle Lanes	Delineate and designate a preferential area for cycling	Collector and arterial roadways Through movements beside right turn lanes	X	A-19
Colored Bike Lanes	Highlight bicycle crossing movements at conflict points	High-conflict transition areas such as exits and merges		A-20
Wide Outside / Curb Lane	Provide ample width for vehicles to overtake bicycles	Collector and arterial roadways without bicycle lanes	X	A-21
Shared Lane Marking	Designate a safe line of travel along parked vehicles	Along parked cars in a lane too narrow for bicycle lanes	X	A-22
Shoulders	Delineate an area for bicycle travel on rural roads	Rural roads with moderate to high volume and/or high average vehicle speeds	X	A-23
Bicycle Paths	Provide a separated facility for non-motorized users	Along waterways and rail corridors with few crossing conflicts	X	A-24
Bike Boulevards	Calm traffic	Low volume streets parallel to busy corridors		A-25
Wayfinding Signage	Guide bicyclists	Beginning of route, before/after decision points		A-26
Road Diet	Reduce traffic speeds by replacing two lanes of traffic with a turn lane	Four lane arterials with frequent left turn movements		A-27
Access Management	Reduce driveway conflicts	Arterial streets with commercial driveways		A-28
Grade Separation: Overpasses	Provide a way across major barriers	Where on-street intersections are not feasible, or interchanges are too busy		A-29
Grade Separation: Underpasses	Provide a way across major barriers	Where on-street intersections are not feasible, or interchanges are too busy		A-30
Bridge Side Paths	Provide a separated facility on a bridge or through a tunnel	On bridges, tunnels and occasionally narrow segments where street travel is infeasible	X	A-31
Signal Timing	Provide sufficient time to cross the intersection	All signals		A-32
Pedestrian Signals	To stop traffic at crossing locations	Crossings of high speed / high volume roadways, or where safety is paramount		A-33
Bicycle Signals	Provide exclusive movement for bicycles through an intersection	Intersections with high bicycle volumes and/or unique bicycle movements		A-34
Bicycle Push Buttons & Loop Detectors	Provide a better waiting position for bicyclists than if they used the pedestrian push button	Actuated or semi-actuated signals where there are no right turn lanes, or a pork chop island		A-35, A-36
Crosswalks	Provide a safe crossing path	Any street crossing (several types)	X	A-37, A-38

Measure	Purpose	Where to Use	Caltrans Standard	Page No.
Curb Ramps and Landings	Enable bicyclists to enter and leave the street	Street intersections, street-path intersections, major destinations	X	A-40
Curb Extensions	Calm vehicle parking and turning movements	Street corners and mid-block parking lanes		A-41
Median Refuge Islands	Enable pedestrians to cross one direction of traffic at a time	Mid-block crossings		A-42
Bicycle Racks	Enable locking of bicycles	Rail stations, bus transfer hubs, destinations		A-43
Bike Stations	Covered secure bicycle parking	High use locations		A-44
Bike Cages	Covered secure bicycle parking in locations/special events with large bike parking needs	High use locations, especially employment centers and special events.		A-44

Corridor Treatments

BICYCLE LANES – ADOPTED CALTRANS STANDARD

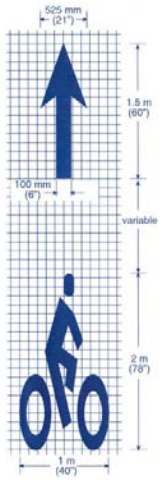
Purpose

To provide bicycles a section of roadway designated by striping, signing and pavement markings for preferential bicycle use. Bicycle lanes must be well marked.

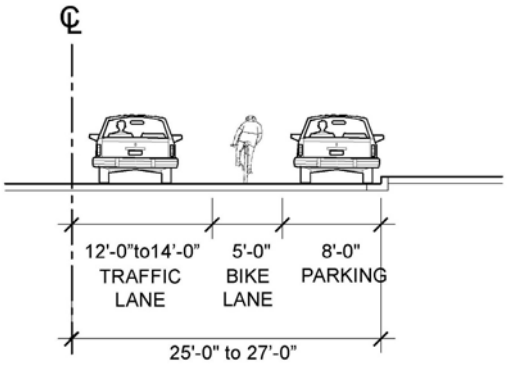
Where to Use

- On urban arterial and major collector roadways
- Average vehicle speeds > 48 km/h (30 mi/h)
- ADT > 10,000
- Vehicle mix includes a significant number of heavy trucks and/or buses

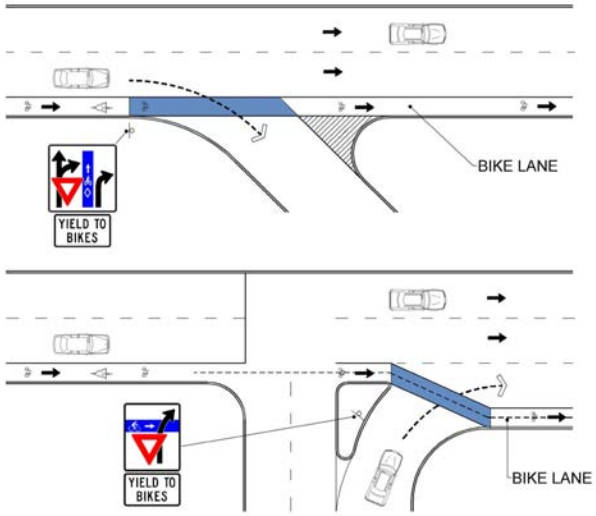
Guidelines

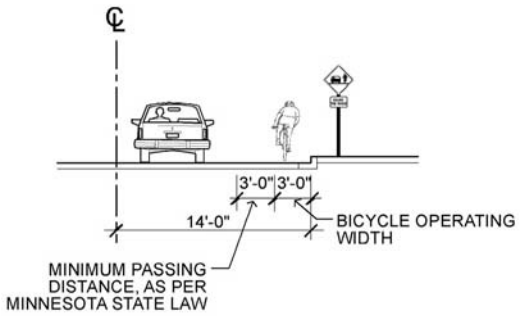


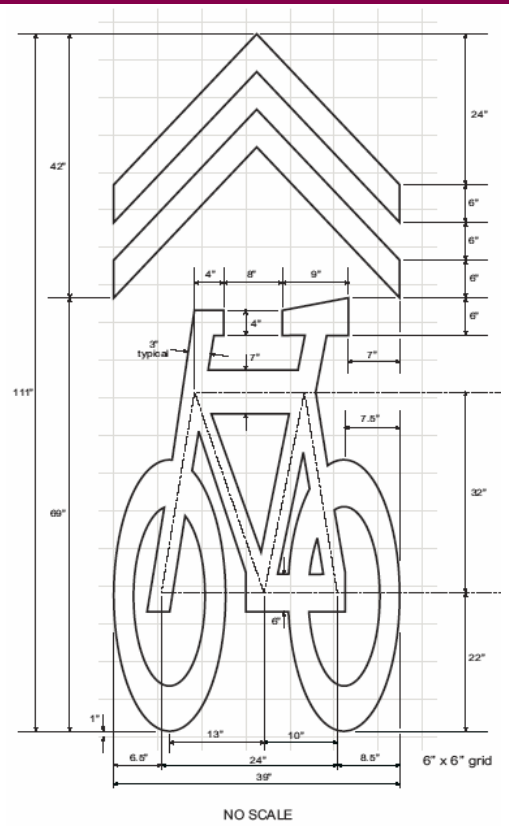
- To retrofit existing lanes, reduce width of (or eliminate) travel, turning or parking lanes.
- Bike lanes should be 1.5 m (5 ft) wide from face of curb or guardrail to the bike lane stripe. There should be at least 1.2 m (4 ft) of rideable surface if the gutter pan joint is not smooth.
- Wider bike lanes (e.g., 1.8 m [6 ft]) are recommended adjacent to parallel parking lanes to account for the door-opening zone.
- In outlying areas without curbs and gutters, a minimum width of 1.2 m (4 ft) is recommended. A width of 1.5 m (5 ft) or greater is preferable where substantial truck traffic is present or where motor vehicle speeds exceed 80 km/h (50 mi/h).



Source: Oregon Department of Transportation

COLORED BIKE LANES		
Purpose	Colored bicycle lanes are used to increase visibility of bicyclists by explicitly defining the bicyclist's path of travel and to remind motorists that they are crossing a bicycle lane and a high-conflict zone. The color is obtained by using a dyed asphalt mix, thermoplastic treatment, or paint.	
Where to Use	• At high-conflict locations where motorists are permitted or required to merge into or across the bicycle lane • Conflict points at highway or bridge on/off ramps and busy intersections • On commuter and/or high use bicycle routes	
Guidelines	• A high visibility lime green color may be preferable. • Identify high-conflict locations. • Pavement markings similar to standard bicycle lane but filled with color at the transition point. • "Yield to Bikes" signs must accompany the treatment. • May be used in combination with bicycle pavement markings.	

WIDE OUTSIDE / CURB LANE – ADOPTED CALTRANS STANDARD		
Purpose	A 4.2 m (14 ft) minimum outside travel lane can better accommodate bicyclists and motorists in the same lane. In most cases, the motorist will not need to change lanes to pass the bicyclist. Bicyclists will have more maneuvering room at driveways and in places with limited sight distance.	 WIDE CURB LANE 
Where to Use	• Vehicle speeds < 48 km/h (30 mi/h) • ADT < 10,000 • In urban areas on major streets where experienced cyclists will likely be operating	
Guidelines	• Usable width is from edge stripe to lane stripe or from the longitudinal joint of the gutter pan to lane stripe. • Gutter pan should not be included as usable width. If there is no gutter pan, add 0.3 m (1 ft) minimum shy distance from face of curb. • 4.5 m (15 ft) of usable width is desirable on sections of roadway where bicyclists need more maneuvering room (e.g., steep grades, limited sight distance). • If traffic speeds exceed 64 km/h (40 mi/h) and ADT exceeds 10,000, 4.5 – 4.8 m (15 – 16 ft) lanes are desirable.	

SHARED LANE MARKING – ADOPTED CALTRANS STANDARD		
Purpose	To direct bicyclists to where they should ride in the roadway out of the "door zone"; to alert motorists that bicycles are riding in a shared roadway.	
Where to Use	• Vehicle speeds < 48 km/h (30 mi/h) • ADT < 10,000 • On urban roadways with width constraints due to on-street parking and/or limited right-of-way. • On suburban/rural roadways to indicate	
Guidelines	• The center of the marking should be 11'0 ft from the curb where parking is allowed; marking placement can be increased for: o Downhill sections (greater than 5%). o Areas where wider vehicles park. o Where cyclists at 11' still may encourage motorists to pass without changing lanes. • The center of the marking should be 4' from curb face to centerline where parking is not allowed, but could be shifted according to: o Lane widths, to position cyclist to either completely take lane or allow for side by side sharing of lane. o Obstacles along curb such as seams, depressed grates, etc.	

Shared Lane Marking

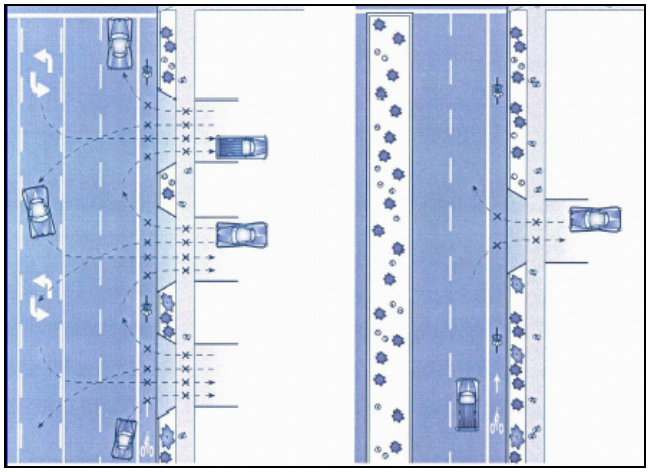
SHOULDERS – ADOPTED CALTRANS STANDARD		
Purpose	The roadway shoulder is striped and divided for one-way bicycle traffic.	
Where to Use	• On designated bicycle routes and/or popular bicycling roadways • ADT > 2,000 • Average vehicle speeds > 56 km/h (35 mi/h) • When there is inadequate sight distance (e.g. corners and hills)	
Guidelines	• Shoulder should be ≥ 1.2 m (4 ft). • Shoulder should be ≥ 1.5 m (5 ft) from the face of the guardrail, curb or other roadside barriers. • Shoulder should be ≥ 2.4 m (8 ft) if motor vehicle speeds exceed 80 km/h (50 mi/h) or if the percentage of trucks, buses and recreation vehicles is high. • Shoulders should be wider where higher volumes of bicyclists are expected. • In the absence of parking, and away from intersections and exits, a striped shoulder functions much like a bicycle lane. At exits and right turn in-out areas, stripe a through bike lane to the left to reduce conflicts for through bicyclists.	

BICYCLE PATHS – ADOPTED CALTRANS STANDARD		
Purpose	Bicycle paths (or shared use paths) are facilities on exclusive right-of-way and with minimal cross flow by motor vehicles. Shared use paths can serve a variety of purposes but generally should be used to serve corridors not served by streets or highways. They should be thought of as a complementary system of off-road transportation routes for bicyclists and others that serve as a necessary extension to the roadway network. Shared use paths should not be used to preclude on-road bicycle facilities, but rather to supplement a system of on-road bike lanes, wide outside lanes, paved shoulders and bike routes (AASHTO Guide).	
Where to Use	• In corridors along rivers, lakes, greenbelts, power lines, railroad tracks, or limited access freeways that link parks, schools, shopping, and/or public transportation • Where there are fewer than 2 driveway/ intersection/road crossings per 1.6 km (1 mi) with a combined ADT of less than 500 • In areas of poor connectivity – to link neighborhoods to schools, parks, shopping and community centers	
Guidelines	• 3.0 m (10 ft) standard width, 3.7 m (12 ft) minimum width in high use areas. • Well-signed with destination and directional information. • Pathway overhead clearance of at least 3.0 (10 ft). • Accessible to sweeping machines and maintenance/emergency vehicles. • Provide safe crossings at intersections and mid-block crossings. 	

BIKE BOULEVARDS		
Purpose	A series of improvements calm traffic on a low volume street to create a safer cycling environment.	
Where to Use	• Low volume streets • Streets parallel to and with a quarter mile of higher volume arterials. • On routes that provide access to key destinations.	
Guidelines	• Traffic calming improvements such as traffic circles, chokers and medians should be used to slow traffic and prevent cut-through traffic. • Road stencils and signs may be used to indicate boulevard. • Stop signs along the boulevard should stop perpendicular traffic. • Bicycle push buttons and loop detectors should activate traffic signals to allow safe crossings of higher volume roadways. • 20 mph speed limits should be considered. 	

WAYFINDING SIGNAGE		
Purpose	Special signs used to guide touring, commuter, and recreational bicyclists through communities and to specific activity areas and destinations, including transit centers.	
Where to Use	• On designated or popular bicycling routes • To guide bicyclists through an urban area	
Guidelines	• Use signs sparingly, primarily at intersections and junctions with other bicycle routes. • A consistent and recognizable logo, arrows and a destination should be on the sign to clearly direct bicyclists. • Bicycle route sign should be accompanied by destination and direction plaques.	 **MUTCD Bike Route Sign**

ROAD DIETS		
Purpose	To reduce traffic speeds and enhance the quality of cycling on a multi-lane undivided road by removing one or more lanes of traffic and reallocating the extra space to a turn lane, additional parking, a bike lane or a combination.	 NE Glisan, Portland, OR before  NE Glisan, Portland, OR after Source: "Pedestrian and Bicycle Facilities in California: A Technology Reference and Technology Transfer Synthesis for Caltrans Planners and Engineers." Prepared by Alta Planning + Design for Caltrans, July 2005.
Where to Use	• Four lane undivided arterials with less than 20,000 ADT. • Where traffic calming measures are supported. • Where left turn movements are common.	
Guidelines	• Four lane undivided roads are generally converted into three-lane roads with a center turn lane. • The typical 48 foot collector can be restriped to accommodate two twelve foot through lanes, one 14 foot center shared turn lane 48, and two 5 foot bicycle lanes.	

ACCESS MANAGEMENT		
Purpose	To avoid conflict at access points onto the main right-of-way between cyclists and motor vehicles	 Before After Source: Oregon Department of Transportation
Where to Use	• On roads with multiple driveway access points. • At entryways for parking garages. • At entryways for apartment complexes or other locations of high vehicular use.	
Guidelines	• Driveways can be consolidated from several parking lots to reduce vehicle-cyclist conflict points. • Enough parking spaces should be provided to prevent vehicles parking in the public right-of-way. • A median preventing turning to/from the far right-of-way lane(s) can significantly reduce the potential conflict points for cyclists. • Stop or yield signs, mirrors, flashing lights, or audible signals can be directed to drivers, not cyclists, in places of low sight distance.	

GRADE SEPARATION: OVERPASSES		
Purpose	A shared use bridge structure allows bicyclists and pedestrians to cross over busy roadways, railways, or bodies of water, and to reach popular destinations	  Los Angeles River at Los Feliz
Where to Use	• At locations that would otherwise be unsafe, difficult, or impossible for bicycles and pedestrians to cross (over freeways, rivers/creeks, multiple railroad tracks, etc.) • Connecting neighborhoods to local schools over high volume and high speed arterials/highways where signalized crossings more than 137.2 m (450 ft) apart • Use only when a safe and direct on-road alignment is not available • Use only when bicyclists and pedestrians aren't required to negotiate significant elevation changes	
Guidelines	• Full engineering and design analysis required.	

GRADE-SEPARATION: UNDERPASSES		
Purpose	A shared use tunnel allows bicyclists and pedestrians to cross high volume/high speed roadways, railroads and/or freeway ramps.	
Where to Use	• When a safe and direct on-street alignment is not available to cross a high volume/high speed roadway or railroad • If the high volume/high speed roadway is elevated • If an existing motor vehicle undercrossing is too narrow for a bicycle and pedestrian facility • Use only when bicyclists and pedestrians aren't required to negotiate significant elevation changes	
Guidelines	• Full engineering and design analysis required. • Must have adequate lighting and sight distance for safety. • Must have adequate overhead clearance of at least 3.1 m (10 ft). • Tunnels should be a minimum 4.3 m (14 ft) for several users to pass one another safely; a 3.0 m x 6.0 m (10 ft x 20 ft) arch is the recommended standard. • "Channeling" with fences and walls into the tunnel should be avoided for safety reasons. • May require drainage if the sag point is lower than the surrounding terrain.	

BRIDGE SIDE PATHS – ADOPTED CALTRANS STANDARD		
Purpose	Bicycle and pedestrian access may be necessary to provide continuity to bicycle facilities and/or reduce barriers in travel corridors (rivers, railroad right-of-way, highway or freeway).	
Where to Use	• Existing or proposed bridge, overpass, underpass or facility over a highway • Stand-alone bicycle/pedestrian structure	
Guidelines	• Options are shared use path, wide curb lane or bike lanes on a bridge. • Designers should provide best alternative that does not increase wrong-way riding or inappropriate crossing movements. Bridge approaches must be accessible by bicyclists and pedestrians.	

Intersection Treatments

SIGNAL TIMING		
Purpose	To provide sufficient time for bicyclists and pedestrians to fully cross the street without having to rush	 Proper signal timing  Countdown signal
Where to Use	• At all signalized intersections	
Guidelines	• While MUTCD defines a "normal" walking speed as 1.22 m/s (4 ft/sec), research indicates that elderly pedestrians and women cross slower than younger pedestrians and men, respectively. Therefore, a signal timing of 2.5 ft/sec is recommended when possible. • Signal timing can be combined with a countdown signal to display the number of seconds remaining in the pedestrian clearance interval. This information benefits pedestrians, bicyclists and motorists. • Sufficient yellow time should be provided to enable bicyclists entering the intersection at the end of the green interval to safely exit the intersection. • In addition to sufficient yellow time as described above, sufficient minimum green time should be provided to enable bicyclists starting from a stopped position at the beginning of green to safely exit the intersection.	

PEDESTRIAN SIGNALS

Purpose	To stop traffic at crossing locations.
Where to Use	• All traffic signals should be equipped with pedestrian signal indications except where pedestrian crossing is prohibited by signage. • On mid-block crossings of high volume/high speed roadways • On roadways adjacent to schools or other high pedestrian activity areas where safety is paramount • Anticipated use must be high enough for motorists to get used to stopping frequently for a red light (a light that is rarely activated may be ignored when in use)
Guidelines	• Signal needs to be timed with other local signals. • Signal may be accompanied by other traffic calming treatments (e.g., raised medians, curb extensions). • Warning signs should be installed for motorists.

BICYCLE SIGNALS		
Purpose	A bicycle-dedicated signal used in conjunction with a pre-existing traffic signal that directs bicyclists to take specific action to address recommended problems	
Where to Use	• At an intersection at which two or more bicycle-related collisions have occurred in one year that could conceivably have been prevented by a bicycle signal. • Intersections at which the volume warrant (product of bicycle traffic count and vehicular traffic count at the same peak hour) is greater than 50,000, provided the bicycle traffic count is greater than 50.	
Guidelines	• Bicycle signals can allow abnormal bicycle movements similar to a pedestrian scramble phase. • Engineering studies must be completed to ensure that the bicycle signal will have the desired effect.	

BICYCLE PUSH BUTTONS

Purpose	For certain intersection approach configurations, to permit through bicyclists to request a crossing phase without having to ride onto the sidewalk and press a pedestrian push button. To minimize intersection delay by requesting a shorter crossing phase than would be needed for pedestrians
Where to Use	• At an actuated or semi-actuated traffic signal at crossings with (a) no right turn only lanes, or (b) right turn only lanes separated from through lanes by a "pork chop" island
Guidelines	• When bicycle push buttons are used, they should be located approximately six feet before the crosswalk so the bicyclist can actuate the button without encroaching into the crosswalk.

Bicycle push button

Bicycle push button
on post before crosswalk

LOOP DETECTORS

Purpose

Loop detectors are devices detect bicycles and trigger actuated signals. The MUTCD 2003 California Supplement addresses bicycle detectors in Section 4D.105, calling for a Type D loop configuration shown on Standard Plan ES-5B. This is effective at detecting bicycles, but should not be located within sidewalks or crosswalks. A loop detector logo as shown below, located in the center of the Type D loop may be used to show bicyclists where to place their bicycles to trigger the signal. Figure 4D-111 in the California Supplement illustrates suggested bicycle detector locations and the Standard Plans for typical bike lane pavement markings. Loop detectors should be located on all new or rebuilt actuated traffic signals, and existing signals on designated bike routes should be a priority for retrofitting with loop detectors.

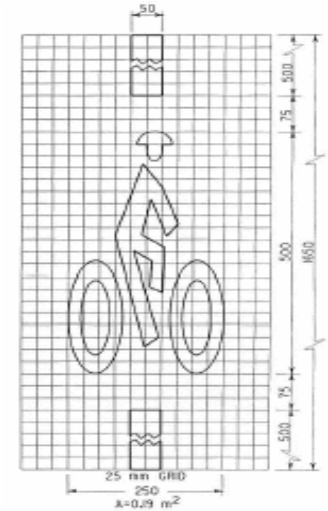
Where to Use

- At signal-controlled intersections where bicycle traffic is high.

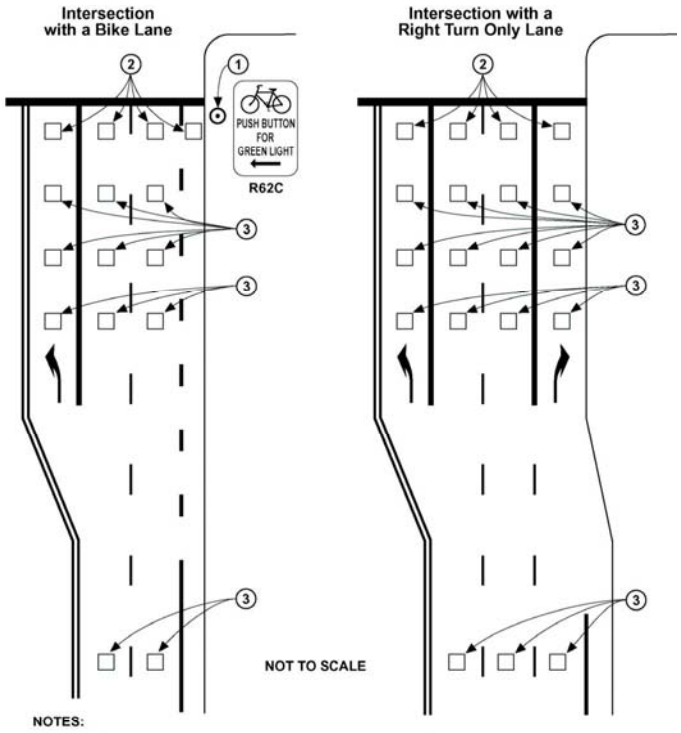
Guidelines

Loop detector logos, if used, would be appropriate for:

- left turn lane
- right-most through lane
- bike lane
- right turn only lane



BICYCLE LOOP DETECTOR SYMBOL



NOTES:

1. Bicycle Push Button and Sign (R62C) or a Type D Loop Detector may be used to activate a traffic signal. A push button should be located so it is convenient to use by bicyclists.
2. Typical Type D Loop Detector locations.
3. Typical Loop Detector locations. See Section 9-03.24.
4. See Standard Plan A24C for Bicycle Loop Detector pavement marking details.

CROSSWALKS – ADOPTED CALTRANS STANDARD		
Purpose	To provide a safe path for pedestrians, including walking bicyclists, to cross a motor vehicle right-of-way.	 Type 1+ Crossing  Type 1 Crossings
Where to Use	See Table 1 for crosswalk type based on ADT, speed, and number of lanes.	
Guidelines	• Type 1 Marked/unprotected crossing consists of a crosswalk, signing, and often no other devices to slow or stop traffic. o The approach depends on an evaluation of vehicular traffic, line of sight, trail traffic, use patterns, vehicle speed, road type and width, and other safety issues such as the proximity of schools. o Warning signs should be installed warning both pedestrians and drivers of the crossing. • Type 1+ Enhanced crossings are designed for multi-lane, higher volume arterials over 15,000 ADT. o High ADT streets may have enhanced crossings if the following guidelines are met: ▪ excellent sight distance ▪ sufficient crossing gaps (more than 60 per hour) ▪ median refuges ▪ active warning devices like flashing beacons or in-pavement flashers ▪ inappropriate if many school children use the crossing ▪ must consider existing and potential future usage • A flashing yellow beacon activated by pedestrians may be used.	

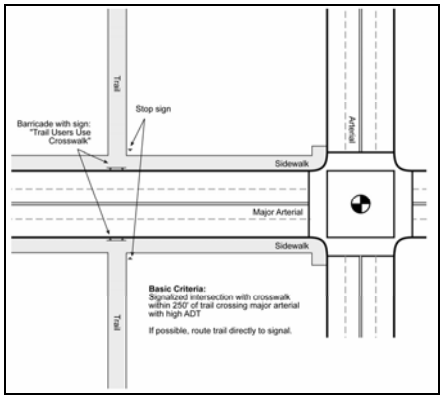
CROSSWALKS (continued) – ADOPTED CALTRANS STANDARD		
Guidelines	• Type 2 Pedestrians are diverted to a signalized intersection with an existing pedestrian crosswalk within 250 ft, rather than unsafe mid-block crossings. o Barriers and signing may be needed to direct trail users to the signalized crossings. o Generally, signal modifications would be made to add pedestrian detection and to comply with ADA. o Often, such as on most community trails parallel to roadways, crossings are simply part of the existing intersection and are not a significant problem for trail users. • Type 3 To be used at pedestrian crossings on high-speed corridors more than 250 ft. from an existing signalized intersection to which pedestrians can be diverted. o Where 85th percentile speeds are 40 mi/h and above and/or ADT exceeds 15,000 vehicles. o Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety. o The maximum delay for signal activation should be two minutes, with minimum crossing times determined by street width. o The signals may rest on flashing yellow or green for motorists when not activated, and should be supplemented by standard advanced warning signs. o Typical costs for a signalized crossing range from $150,000 to $250,000. o Trail signals are normally activated by push buttons, but also may be triggered by motion detectors.	 Type 2 Crossing  Type 3 Crossing NOTE: The Pedestrian Volume signal warrant is intended for the application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. For signal warrant analysis, a location with a wide median, even if the median width is greater than 9 m (30 ft), should be considered as one intersection.

Table A-3 – Summary of Bike Path-Roadway Crossing Considerations[1]

Roadway Type (Number of Travel Lanes and Median Type)	Vehicle ADT ≤ 9,000			Vehicle ADT > 9,000 to 12,000			Vehicle ADT > 12,000 to 15,000			Vehicle ADT > 15,000		
	Speed Limit **											
	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h
2 Lanes	1	1	1/1+	1	1	1/1+	1	1	1+/3	1	1/1+	1+/3
3 Lanes	1	1	1/1+	1	1/1+	1/1+	1/1+	1/1+	1+/3	1/1+	1+/3	1+/3
Multi-Lane (4 or more lanes) with raised median ***	1	1	1/1+	1	1/1+	1+/3	1/1+	1/1+	1+/3	1+/3	1+/3	1+/3
Multi-Lane (4 or more lanes) without raised median	1	1/1+	1+/3	1/1+	1/1+	1+/3	1+/3	1+/3	1+/3	1+/3	1+/3	1+/3

* **General Notes:** Crosswalks should not be marked at locations that could present an increased risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalk markings alone **will not** make crossings safer, nor will they necessarily result in more motorists stopping for pedestrians. Whether or not crosswalks are marked, it is important to consider other pedestrian facility enhancements (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb extensions), as needed, to improve the safety of the crossing. **These are general recommendations; good engineering judgment should be used in individual cases for deciding which treatment to use.**

For each trail-roadway crossing, an engineering study is needed to determine the proper location. For each engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volume, vehicle speed, sight distance, vehicle mix, etc. may be needed at other sites.

** Where the speed limit exceeds 40 mi/h (64.4 km/h), crosswalk markings alone should not be used at unsignalized locations.

*** The raised median or crossing island must be at least 4 ft (1.2 m) wide and 6 ft (1.8 m) long to adequately serve as a refuge area for pedestrians in accordance with MUTCD and AASHTO guidelines. A two-way center turn lane is not considered a median.

1= Type 1 Crossings. Ladder-style crosswalk markings with appropriate signage should be used.

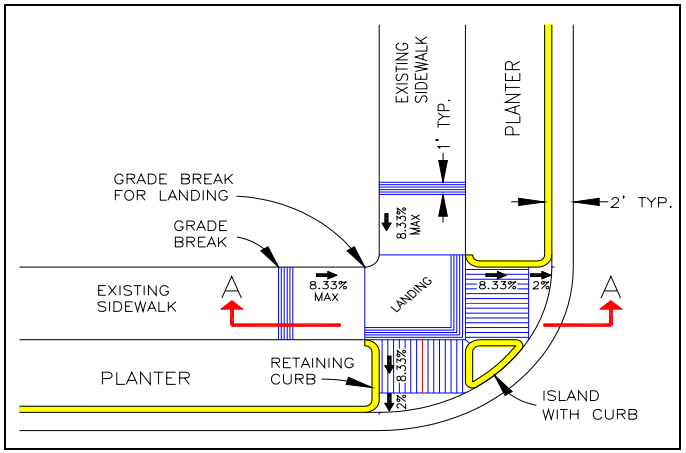
1/1+ = With the higher volumes and speeds, enhanced treatments should be used, including ladder style crosswalk markings, median refuges, flashing beacons, and/or in-pavement flashers. Ensure that there are sufficient gaps through signal timing, as well as sight distance.

1+/3 = Carefully analyze signal warrants using a combination of Warrant 2 or 5 (depending on school presence) and EAU factoring. Make sure to project trail usage based on future potential demand. Consider Pelican, Puffin, or Hawk signals in lieu of full signals. For those intersections not meeting warrants or where engineering judgment or cost recommends against signalization, implement Type 1 enhanced crosswalk markings with marked ladder style crosswalks, median refuge, flashing beacons, and/or in-pavement flashers. Ensure there are sufficient gaps through signal timing, as well as sight distance.

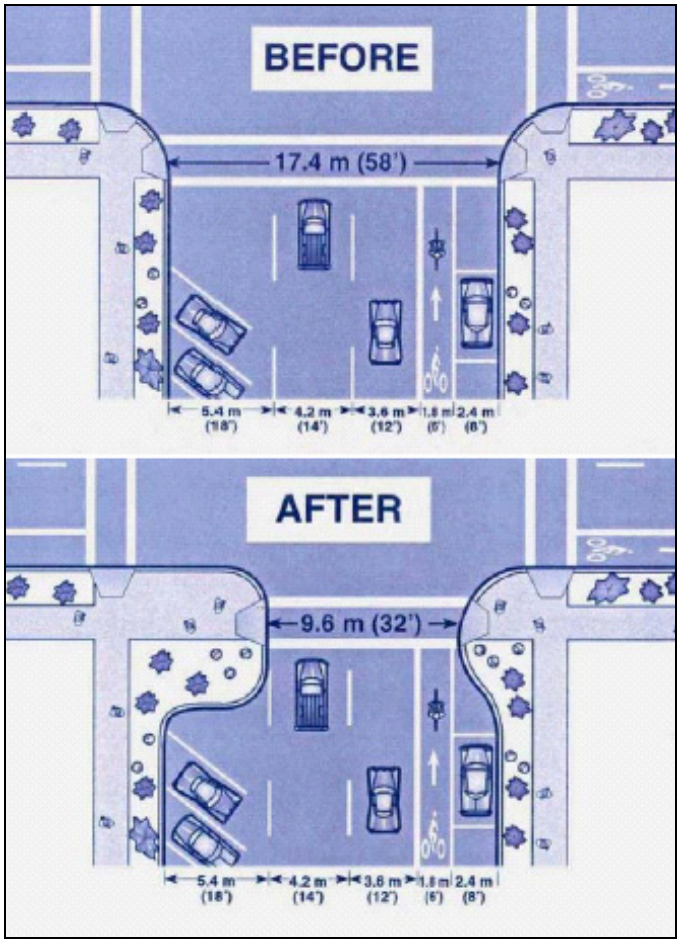
[1] This table is based on information contained in the U.S. Department of Transportation Federal Highway Administration Study, " Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations," February 2002.

CURB RAMPS AND LANDINGS – ADOPTED CALTRANS STANDARD

Purpose	Following ADA guidelines, curb cuts make the sidewalk accessible from the roadway level of the crosswalk, while curb ramps make it possible to change direction after completing the ascent from street level, rather than during the rise, avoiding travel across the compound slope of a side flare. Top landings also allow pedestrians to bypass curb ramps entirely when traveling around a corner.
Where to Use	• At every intersection location where there is a crosswalk, whether or not the crosswalk is marked.
Guidelines	• Ramp runs shall have a running slope not steeper than 1:12 • Cross slopes of ramp runs shall not be steeper than 1:48 • Counter slopes for of surfaces adjacent to curb ramps shall not exceed 1:20 • The landing shall be at least as wide as the ramp leading to it • The landing length shall be at least 1.5m (5 feet)

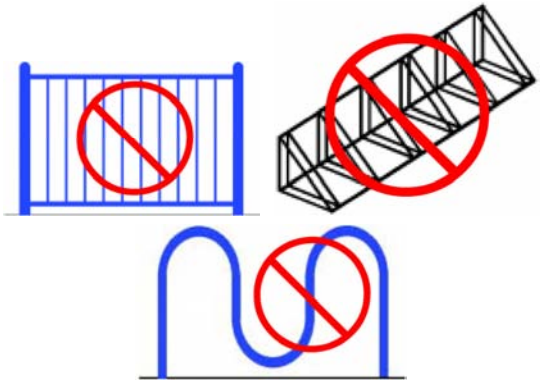


Curb cuts

CURB EXTENSIONS		
Purpose	If designed correctly, this measure could reduce vehicle speed, making the conditions safer for bicyclists and pedestrians. To minimize pedestrian exposure during crossing by shortening crossing distance and give pedestrians a better chance to see and be seen before committing to crossing. To help slow traffic and improve conditions for bicycling	 (Source: Oregon Department of Transportation) Curb extensions
Where to Use	• Appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb. • The outside face of a curb extension in a parallel parking lanes should not be more than 9 feet from the curb, to partly block the "door zone" from bicycle travel without impeding bicyclists on safe lines of travel • If there is no parking lane, curb extensions may be a problem for bicycle travel and truck or bus turning movements.	
Guidelines	• In most cases, the curb extension should be designed to transition between the extended curb and the running curb in the shortest practicable distance. • For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 3m (10 ft) and the two radii should be balanced to be nearly equal.	

MEDIAN REFUGE ISLANDS		
Purpose	To minimize exposure of pedestrians (including walking bicyclists) during crossing by shortening crossing distance and increasing the number of available gaps for crossing.	 Median refuge islands
Where to Use	• Appropriate where the roadway to be crossed is greater than 15.2 m (50 ft) wide or more than four travel lanes; can be used where distance is less to increase available safe gaps. Use at signalized or unsignalized crosswalks.	
Guidelines	• The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings. • A median refuge island should be at least 1.8 m (6 ft) wide between travel lanes and at least 6.1 m (20 ft) long. On streets with speeds higher than 25 mph there should also be double centerline marking, reflectors, and "KEEP RIGHT" signage. • If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. Tree species should be selected for small diameter trunks and tree branches should be no lower than 4.3 m (14 ft). Shrubs and ground plantings should be no higher than 457 mm (1 ft 6 in). • Refuge islands at intersections should have a median "nose" that gives protection to the crossing pedestrian (see illustration).	

Station-Area Treatments

BICYCLE RACKS		
Purpose	To provide a safe place for bicyclists to lock their bikes.	 Acceptable Bicycle Racks
Where to Use	• Urban retail and commercial centers • Pedestrian malls • At specific juncture points: carpool lots, bus and train stations, trailheads for bicycle paths • At any location with a high current or expected amount of bicycle traffic • Bicycle parking should be situated no farther than the closest motor vehicle parking space from a building, and within 15.2m (50 ft) from the building's main entrance.	
Guidelines	• Quality racks should be properly secured to the ground using vandal-proof hardware to prevent theft. • Racks should allow the user to lock her bike frame and front wheel to the rack using a standard "U-Lock". • Unacceptable racks include "wheelbender" racks or others that do not allow proper locking. • Weather protection should be afforded whenever possible • Placement of racks is very important – allow enough room between racks and away from a barrier. • Use vandalproof hardware.	 Unacceptable Bicycle Racks

BIKE STATIONS		
Purpose	Provide covered, secure bicycle parking.	 Long Beach BikeStation (Photo courtesy of BikeStation®)
Where to Use	• At high use locations	
Guidelines	• Typically an attended facility that also provides bicycle rentals and/or servicing. • May also provide food and drink.	

BIKE CAGES		
Purpose	Provide covered, secure bicycle parking.	 **Source: Missoula Institute for Sustainable Transportation, "Elements of Sustainable Transportation" http://www.strans.org/parkpix.html**
Where to Use	• In parking structures and larger employment centers • At special events	
Guidelines	• May be attended or self-access via a key or cord. • May require high capacity racks • Should be in visible location.	

APPENDIX D: TECHNICAL GUIDANCE FOR PLANNERS AND ENGINEERS

TEA-21

The Transportation Equity Act for the 21st Century (TEA-21), passed by Congress and signed into law in 1998 and expired in 2003, continued the integration of bicycling and walking into the transportation mainstream. TEA-21 required that local jurisdictions consider bicycling and walking in transportation plans and projects. Section 1202 states that bicycling and walking facilities "shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use is not permitted."

Like ISTEA, bicycle projects could be funded through one of the TEA-21 programs, the Congestion Mitigation and Air Quality (CMAQ) Improvement Program, the Recreational Trails Program, the Regional Surface Transportation Program (RSTP), and the Transportation Enhancement Activities (TEA) programs.

Federal Highway Administration (US DOT)

Numerous resources and publications are listed on the FHWA Bicycle and Pedestrian Program website on legislation, design, and safety. There is a link to State Bicycle and Pedestrian Coordinators, the Pedestrian and Bicycle Information Center (PBIC), and the Association of Pedestrian and Bicycle Professionals (apbp). Reference materials can be downloaded from http://www.fhwa.dot.gov/environment/bikeped/ in the areas of Planning and Design Guidance, Traffic Calming, Forecasting Demand, Shared-Use Paths, Transit, and Benefits.

State Department of Transportation (Caltrans) Guidelines

1. Deputy Directive Number 22: Context Sensitive Solutions

Caltrans approved DD-22 in November 2001. The statement reads, "The Department uses Context Sensitive Solutions as an approach to plan, design, construct, maintain, and operate its transportation system. These solutions use innovative and inclusive approaches that integrate and balance community, aesthetic, historic, and environmental values with transportation safety, maintenance, and performance goals. Context sensitive solutions are reached through a collaborative, interdisciplinary approach involving all stakeholders."

2. Deputy Directive Number DD-64: Accommodating Non-Motorized Travel

Caltrans approved DD-64 in June 2005. The statement reads, "The Department fully considers the needs of non-motorized travelers (including pedestrians, bicyclists and persons with disabilities) in all programming, planning, maintenance, construction, operations and project development activities and products. This includes incorporation of the best available standards in all of the Department's practices. The Department adopts the best practice concepts in the US DOT Policy Statement on Integrating Bicycling and Walking into Transportation Infrastructure." For the full text, see the Caltrans website at www.dot.ca.gov..

3. California Blueprint for Bicycling and Walking

The Blueprint describes Caltran's implementation goals to increase bicycling and walking, improve bicycling and walking safety, and develop appropriate funding for bicycle and pedestrian projects, pursuant to DD-64.

For more information on these items, refer to www.dot.gov.

4. California Highway Design Manual

It is a requirement that California Highway Design Manual standards be followed for all federal and state funded bicycle projects.

Chapter 80, Application of Standards, includes Highway Design Manual Standards, Requirements for Approvals for Nonstandard Design, Use of FHWA and AASHTO Standards and Policies, and Mandatory Procedural Requirements.

Chapter 200, Geometric Design and Structure Standards, includes standards for Pedestrian Overcrossings and Undercrossings, and Bicycle and Bridge Railings.

Chapter 1000, Bikeway Planning and Design, includes General Planning Criteria, Design Criteria, and Uniform Signs, Markings and Traffic Control Devices.

5. Pedestrian and Bicycle Facilities in California: A Technical Reference and Technology Transfer Synthesis for Caltrans Planners and Engineers, July 2005

Included in this document are: DD-64, acronyms, Federal and State Statutes, design practices for bicycles and pedestrians, and other useful materials in the Appendices.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO last updated The Guide for the Development of Bicycle Facilities in 1999. This guide is designed to provide information on the development of facilities to enhance and encourage safe bicycle travel and to help accommodate bicycle traffic in most riding environments. Safe, convenient, and well-designed facilities are essential to encourage bicycle use. The majority of bicycling will take place on ordinary roads with no dedicated space for bicyclists.

Manual on Uniform Traffic Control Devices (MUTCD)

The MUTCD is published by the Federal Highway Administration and defines the national standards used by road managers to install and maintain traffic control devices on all streets and highways. Traffic control devices regulated under the MUTCD include signs, pavement markings, and signals. The purpose of the MUTCD is to promote safety and efficiency on the nation's streets and highways by ensuring that traffic control devices are uniform. Bikeway signs and markings are contained within Chapter 9 of the MUTCD. The State of California has issued a supplement to the MUTCD, the MUTCD 2003 California Supplement, which contains additional guidance on traffic control devices, including bikeways.

Metro Bicycle Planning Documents

1. Bike-Transit Center Implementation Plan (BTCIP), September 2004.

A bike-transit center is a facility that provides at least twenty (20) fee-based, secure bicycle parking spaces, attended or unattended, adjacent to a transit stop in an effort to encourage bike-to-transit connections. The BTCIP sets standards and criteria for creating bike-transit centers at transit stations and provides the tools to do the conceptual planning. Four model plans were prepared: Memorial Park Metro Gold Line Station in the City of Pasadena, Norwalk Metro Green Line Station in the City of Norwalk, North Hollywood Metro Red Line Station in the City of Los Angeles, and a conceptual plan for the City of Santa Monica.

Moving just 100 short-distance commuters from driving a car to riding a bicycle could represent a park-and-ride capital savings of $850,000 to $2.5 million. This shift would free up valuable car-parking spaces at impacted lots for long-distance commuters. Bicycle use results in air quality benefits and energy savings. Bike-transit centers have the potential to help capture a customer base untouched by Metro's current facilities.

2. Enhanced Public Outreach Project for Metro's Bicycle Transportation Strategic Plan (BTSP), September 2004.

An outreach project in low-income communities with high levels of transit-use to gain a profile of bicycle users and a better understanding of the needs of bicyclists to supplement Metro's BTSP. Surveys were conducted by mail, on-line and in the field at 50 different locations. There were a total of 3,084 survey respondents. Survey results identified the most important obstacles to bicycling as the following:

Obstacles	Field	Mail/On-line
Safety Concerns	71%	60%
Lack of Bikeways	66%	62%
Lack of Secure Bicycle Parking	55%	31%
Exposure to Automobile Pollution	53%	27%
Lack of Skills to Ride Confidently	25%	10%