

EXISTING CONDITIONS LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
1021	234	4	0	0	0	0	8	0	0	0	0	0	0	0
1022	189	0	0	0	0	0	79.051	0	298.915	0	284.798	0	0	0
1026	151	4	0	0	0	0	0	0	0	0	0	0	0	0
1027	129	18	0	0	0	0	0	40.233	68.849	0	0	0	0	0
1041	187	2	0	0	0	0	0	0	0	0	0	0	0	0
1042	168	0	0	0	0	0	0	0	0	0	0	0	0	0
1061	58	4	0	0	0	0	10.459	99.082	1645.28	0	0	0	0	0
1081	0	0	0	0	0	241.7	0	0	0	0	0	0	0	0
1082	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1083	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1084	8	0	0	0	0	0	79	0	201	0	0	0	0	0
1085	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1086	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1087	2	0	0	0	0	0	0	0	0	0	0	0	0	0
1101	238	418	0	0	0	0	44.535	22.2	11.546	0	0	0	0	0
1102	4	0	0	0	0	0	0	0	0	0	0	0	0	0
1103	13	0	0	0	0	0	0	0	0	0	0	0	0	0
1104	69	0	0	0	0	0	0	0	0	0	0	0	0	0
1121	27	6	0	0	0	0	107.77	11.783	130.137	0	0	0	625	0
1141	27	0	0	0	0	0	16.434	0	0	0	0	0	0	0
1142	79	4	0	0	0	0	0	0	0	0	11.515	0	0	0
1143	16	212	0	0	0	0	58.176	0	0	0	0	0	0	0
1161	240	0	0	0	0	0	0	0	0	0	0	0	0	0
1162	221	0	0	0	0	0	53.743	86.873	0	0	0	0	42	0
1163	101	0	0	0	0	4.135	0	0	0	0	0	0	0	0
1164	138	11	0	0	0	0	7.267	48.276	0	0	8.175	0	0	0
1165	99	0	0	0	0	0	0	0	0	0	0	0	0	0
1166	94	47	0	0	0	0	34.646	9.207	0	0	0	0	0	0
1181	36	117	0	0	0	0	62.127	199.402	65.039	0	0	0	0	0
1182	105	102	0	0	0	0	31.392	18.616	14.416	0	0	0	0	0
1183	14	381	0	0	0	0	27.928	50.615	14.058	0	0	0	0	0
1201	22	177	0	0	0	0	0	0	0	0	0	0	0	0
1202	9	72	0	0	0	0	0	0	0	0	0	0	0	0
1203	56	135	0	0	0	0	0	0	0	0	0	0	0	0
1204	123	6	0	0	0	0	13.638	74.2	0	0	0	0	0	0
1205	13	373	0	0	0	0	0	0	0	0	52.55	0	0	0
1221	26	122	0	0	0	0	176.052	40.51	11.868	0	22.602	0	0	0

EXISTING CONDITIONS LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
1484	44	16	0	0	0	0	0	0	0	0	0	0	0	0
1501	70	0	0	0	0	0	0	0	0	0	0	0	0	0
1502	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1503	51	0	0	0	0	0	0	0	0	0	0	0	0	0
1504	72	4	0	0	0	0	0	0	0	0	0	0	0	0
1505	17	0	0	0	0	0	0	0	0	0	0	0	0	0
1506	95	10	0	0	0	0	0	0	10.301	0	0	0	0	0
1507	127	26	0	0	0	0	0	0	0	0	0	0	0	0
1508	46	30	0	0	0	0	0	0	0	0	0	0	0	0
1509	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1521	9	92	0	0	0	0	0	0	0	0	0	0	0	0
1522	63	630	0	0	0	0	25.114	28.362	0	0	0	0	0	0
1523	63	86	0	0	0	0	0	80.263	0	0	0	73.15	0	0
1524	27	142	31	0	0	0	194.868	0	0	0	0	0	0	0
1541	133	124	19	0	0	0	119.076	35.655	6.532	0	24.92	0	275	0
1561	100	96	0	0	0	0	0	0	0	0	0	17.52	0	0
1562	24	80	0	0	0	0	0	0	18.63	0	0	0	0	0
1563	52	49	0	0	0	0	0	20.935	0	0	31.61	0	0	0
1581	108	15	36	0	0	0	192.926	57.212	0	0	0	0	0	0
1582	1	101	30	0	0	0	54.754	5.565	0	0	0	0	0	0
1583	64	220	0	0	0	0	0	0	0	0	0	0	0	0
1601	176	285	74	0	0	0	68.269	50.121	0	0	0	0	0	0
1621	6	253	0	0	0	0	57.403	126.993	0	83.9	0	13.09	0	0
1622	0	48	0	0	0	0	18.806	5.538	0	0	0	62.5	0	0
1623	0	88	0	0	0	0	0	104.563	0	0	0	235.105	0	0
1624	1	12	298	0	0	0	16.258	137.253	0	0	0	18.137	0	0
1641	53	77	32	0	211.5	0	31.349	6.762	2.273	0	2.369	0	0	0
1642	87	83	0	0	0	0	4.761	23.521	0	0	5.629	49.014	0	0
1643	74	12	0	0	0	0	24.137	37.807	0	0	0	0	0	0
1644	73	93	0	0	0	0	54.062	3.572	0	0	0	0	0	0
1661	144	62	0	0	0	0	62.969	31.891	0	0	5.17	0	0	0
1662	4	348	0	0	0	0	3.151	15.161	0	0	26.775	0	0	0
1681	82	39	5	0	0	0	0	24.389	0	0	0	4.503	0	0
1682	51	39	0	0	0	0	19.265	5.786	8.783	0	0	0	0	0
1683	107	24	0	0	0	0	39.64	33.155	0	1.351	26.9	0	418	0
1684	86	51	0	0	0	0	10.767	11.052	0	0	0	0	0	0
1685	52	27	0	0	0	0	25.66	11.173	0	0	0	0	0	0

EXISTING CONDITIONS LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
2342	52	2	0	0	0	0	0	0	0	0	0	0	0	0
2344	25	0	0	0	0	0	0	0	382.526	0	0	0	0	0
2345	7	0	0	0	0	0	0	0	133.856	0	0	0	0	0
2346	22	0	0	0	0	0	89.331	0	80.668	0	0	0	0	0
2347	1	0	0	0	0	0	380.191	33.421	171.987	0	7.055	0	0	0
2361	69	0	0	0	0	0	19.783	0	49.046	0	0	0	0	0
2362	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2363	3	2	0	0	0	0	0	0	0	0	0	0	0	0
2383	31	0	0	0	0	0	0	0	0	0	0	0	0	0
2384	24	0	0	0	0	0	0	0	0	0	0	0	0	0
2385	106	12	0	0	0	34	0	0	0	25	0	0	0	0
2386	1	0	0	0	0	0	60	0	86	0	0	0	0	0
2387	122	7	0	0	0	0	0	0	128	0	0	0	0	0
2388	184	10	0	0	0	0	0	0	0	0	0	0	0	0
2401	9	4	0	0	0	0	0	72.279	574.001	0	0	0	0	0
2402	87	11	0	0	0	0	0	0	0	0	0	0	0	0
2403	49	38	18	0	0	0	86.009	0	884.041	0	0	0	0	0
2405	0	0	0	0	0	0	84.01	15.927	1206.333	0	0	0	0	0
2406	55	149	0	0	0	0	3.002	0	0	0	0	0	0	0
2407	60	49	0	0	0	0	0	0	0	0	0	0	0	0
2408	109	60	0	0	0	0	0	0	0	0	0	0	0	0
2409	23	183	0	0	0	0	0	0	0	0	0	0	0	0
2421	0	0	90	0	0	0	87.828	65.248	52.332	27.9	0	0	42	194.482
2422	1	0	0	0	0	0	33.158	126.829	0	0	0	0	0	0
2423	46	62	0	0	0	0	169.257	0	315.093	0	0	0	0	0
2424	0	0	0	0	0	0	87.095	10.992	473.239	0	6.697	0	0	0
2425	98	66	0	0	0	0	19.999	17.509	11.28	0	0	0	0	0
2441	7	2	0	0	0	11.193	89.658	108.743	0	30.4	0	0	338	0
2442	66	14	0	0	0	0	0	0	0	0	0	0	0	0
2443	104	30	0	0	0	2.158	0	0	0	0	4.473	0	0	0
2444	83	51	0	0	0	27.596	4.302	0	7.594	0	3.54	0	0	0
2447	99	24	0	0	0	0	8.746	0	35.411	0	22.578	0	0	0
2461	179	72	27	0	0	2.978	29.662	4.205	5.932	0	20.587	0	0	0
2463	32	40	0	0	0	0	11.984	5.924	0	0	0	0	0	0
2464	49	88	0	0	0	0	28.472	4.5	7.81	0	4.22	0	0	0
2465	51	56	0	0	0	0	0.693	0	0	0	0	0	0	0
2466	44	79	0	0	0	0	3.07	2.657	0	0	0	0	0	0

EXISTING CONDITIONS LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
2481	78	154	0	0	0	0.361	39.377	0	0	0	1.486	0	0	0
2482	120	65	0	0	0	0	60.726	0	0	0	0	0	0	0
2483	34	37	0	0	0	0	21.283	0	3.16	0	0	0	359	0
2501	129	23	0	0	0	0	0	0	0	0	0	0	0	0
2502	48	4	0	0	0	64.23	0	0	0	0	0	0	0	0
2503	141	84	0	0	0	0	4.95	2.31	6.69	0	0	0	0	0
2504	72	79	0	0	0	0	8.645	9.604	19.71	0	6.758	0	0	0
2505	27	0	0	0	0	0	19.334	20.069	3.012	0	0	0	0	0
2521	48	30	0	0	0	0	0	0	0	0	0	0	0	0
2522	12	22	0	0	0	0	9.875	47.17	0	0	0	0	0	0
2523	3	4	0	0	0	0	29.123	9.518	0	0	0	0	0	0
2541	2	0	0	0	0	0.303	22.851	0	6.33	0	0	0	0	0
2542	32	49	0	0	0	0	21.32	0	0	0	0	0	0	0
2543	55	79	0	0	0	0	0	0	0	0	0	0	0	0
2544	21	82	10	80	0	0	24.013	27.389	0	0	21.834	0	0	0
2545	77	63	0	0	0	0	7.641	0	0	0	0	0	0	0
2561	8	38	0	0	0	0	0	0	0	0	0	0	0	0
2562	10	13	0	0	0	0	0	4.759	0	0	6.785	0	0	0
2563	0	12	0	0	0	0	35.679	2.437	0.94	0	0	0	0	0
2564	0	0	0	0	0	0	16.164	2.523	10.466	0	0	0	0	0
2565	1	11	78	0	0	0	8.342	4.825	0	0	0	0	0	0
2566	8	82	0	0	0	0	6.953	0	0	0	0	0	0	0
2571	22	71	0	0	0	0	2.748	0	0	0	0	0	0	0
2572	17	62	0	0	0	0	3.178	0	11.99	0	0	0	0	0
2573	0	0	0	0	0	0	0	0	16.397	0	0	0	0	0
2574	0	0	0	0	0	0	0	0	9.037	0	0	0	0	0
2575	2	83	0	0	0	0	6.34	0	13.209	0	18.727	0	0	0
2576	9	30	0	0	0	0	1.41	0	0	0	12.338	0	0	0
2578	9	25	0	0	0	0	0	0	0	0	0	0	0	0
2579	7	17	0	0	0	0	0	0	0	0	0	0	0	0
2581	0	0	0	17034	0	2.948	28.844	2.791	0	0	17.267	0	0	0
2582	1	0	0	0	0	0	3.684	0	0	0	2.947	0	0	0
2583	0	0	0	0	0	0	25.554	4.815	0	0	0	0	0	0
2584	0	0	0	0	0	1.591	14.745	24.352	0	0	2.047	0	0	0
2585	15	37	0	0	0	0	0	15.79	0	0	2.225	0	0	0
2586	0	0	43	0	0	0	30.963	22.581	0	0	6.338	0	0	0
2587	14	69	0	0	0	0	3.059	10.775	0	0	6.675	0	0	0

EXISTING CONDITIONS LAND USE

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2621	3	7	0	0	0	0	3.922	0	34.887	0	0	0	0	0
2622	0	3	0	0	0	0	27.947	0	10.989	0	0	0	0	0
2623	17	27	0	0	0	0	10.787	0	9.286	0	0	0	0	0
2624	11	36	0	0	0	0	0	0	0	0	0	0	0	0
2625	13	18	0	0	0	0	0	0	0	0	0	0	0	0
2626	13	42	0	0	0	0	0	0	0	0	0	0	0	0
2641	45	252	0	0	0	0	31.204	3.607	0	0	0	0	0	0
2642	4	339	0	0	0	0	15.213	0	0	0	0	0	0	0
2643	51	489	0	0	0	0	30.965	0	25.994	0	0	0	0	0
2661	2	3	0	0	0	0	8.592	0	0	0	0	0	0	0
2662	0	22	0	0	0	0	19.392	0	6.973	0	0	0	0	0
2663	5	30	0	0	0	1.126	9.625	2.261	13.692	13.8	0	0	0	0
2664	18	187	0	0	0	0	14.627	21.83	28.805	0	0	0	0	0
2665	26	112	0	0	0	0	5.099	0	38.021	4.5	0	0	0	0
2666	18	8	0	0	0	0	0	0	0	0	0	0	0	0
2667	8	9	0	0	0	0	7.174	0	0	13.36	0	0	0	0
2668	13	100	0	0	0	0	21.181	2.354	0	0	0	0	0	0
2669	18	101	0	0	0	0	0	0	0	0	0	0	475	0
2681	322	15	0	0	0	0	0	0	170	0	0	0	0	0
2682	49	3	0	0	0	0	0	0	0	0	0	0	0	0
2683	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2684	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	16	0	0	0	0	0	0	0	0	0	0	0	0	0
2702	6	4	0	0	0	0	0	0	0	0	0	0	0	0
2703	10	2	0	0	0	0	0	0	0	0	0	0	0	0
2704	7	0	0	0	0	0	0	0	0	0	0	0	0	0
2705	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2721	12	2	0	0	12.2	0	11.914	0	33.901	0	0	0	0	0
2722	11	14	0	0	0	0	1.777	72.927	267.917	0	0	0	0	0
2723	19	4	0	0	0	0	112.446	38.305	188.856	0	8.318	0	0	0
2724	29	4	0	0	0	0	17.106	100.953	152.507	0	0	0	0	0
2725	35	11	0	0	0	0	50.309	0	133.446	0	0	0	0	0
2726	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2741	6	254	0	0	0	0	67.037	4.46	33.362	0	0	0	0	0
2742	25	719	0	0	0	0	18.439	12.064	54.474	0	0	0	0	0
2744	3	84	0	0	0	0	25.334	59.7	115.838	0	16.863	0	0	0
2745	18	2	0	0	0	0	4.966	0	100.466	0	0	0	0	0

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23817	37	2	0	0	0	0	0	0	0	0	0	0	0	0
23818	13	0	0	0	0	0	0	0	0	0	0	0	0	0
23819	5	0	0	0	0	0	0	0	0	0	0	0	0	0
25710	5	27	0	0	0	0	0	0	0	0	0	0	0	0
25711	1	4	0	0	0	0	0	0	0	0	0	0	0	0
26610	4	0	0	0	0	0	0	0	0	0	0	0	0	0
26612	82	266	0	0	0	0	16.518	0	66.705	0	0	0	0	0
26613	27	82	0	0	0	0	15.775	0	0	0	0	0	0	0
27410	99	0	0	0	0	0	0	0	0	0	0	0	0	0
27411	201	50	0	0	0	0	0	0	0	0	0	0	682	0
27810	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70011	35	2	0	0	0	0	0	0	0	0	0	0	0	0
70013	26	0	0	0	0	0	0	0	0	0	0	0	0	0
70014	0	0	0	0	0	0	143.927	0	74.74	0	0	0	0	0
70015	0	0	0	0	0	0	20.199	0	127.6	0	0	0	0	0
100001	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100002	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100004	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100007	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100008	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100009	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100010	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Fehr & Peers, 2010

PREFERRED ALTERNATIVE LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
1021	234	4	0	0	0	0	8	0	0	0	0	0	0	0
1022	189	0	0	0	0	0	173.785	0	298.915	0	284.798	0	0	0
1026	151	4	0	0	0	0	0	0	0	0	0	0	0	0
1027	141	18	0	0	0	0	0	40.233	68.849	0	0	0	0	0
1041	187	2	0	0	0	0	0	0	0	0	0	0	0	0
1042	340	1727	0	0	0	0	93.007	240.17	720.509	16.539	0	0	1000	0
1061	58	26	0	0	0	0	105.715	99.082	3533.92	0	0	0	0	0
1081	0	0	0	0	0	241.7	0	0	0	0	0	0	0	0
1082	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1083	0	1	0	0	0	0	0	52.821	158.463	0	0	0	0	0
1084	8	2	0	0	0	0	79	119.424	559.273	0	0	0	0	0
1085	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1086	8	0	0	0	0	0	0	0	0	0	0	0	0	0
1087	2	0	0	0	0	0	0	0	0	0	0	0	0	0
1101	838	1328	0	0	0	0	104.973	52.13	11.546	0	0	0	0	0
1102	84	0	0	0	0	0	0	0	0	0	0	0	0	0
1103	13	0	0	0	0	0	0	0	0	0	0	0	0	0
1104	69	0	0	0	0	0	0	0	0	0	0	0	0	0
1121	27	84	0	0	0	0	145.617	37.014	135.849	0	0	0	625	0
1141	27	0	0	0	0	0	16.434	0	54.364	0	0	0	0	0
1142	147	783	0	0	0	0	22.021	2.447	0	0	11.515	0	0	0
1143	292	474	0	0	0	0	58.176	0	0	0	0	0	0	0
1161	271	0	0	0	0	0	0	0	0	0	0	0	0	0
1162	221	29	0	0	0	0	81.171	228.064	0	0	0	0	42	0
1163	101	0	0	0	0	4.135	0	0	0	0	0	0	0	0
1164	138	28	0	0	0	0	14.107	75.503	0	0	8.175	0	0	0
1165	99	0	0	0	0	0	0	0	0	0	0	0	0	0
1166	94	55	0	0	0	0	44.716	28.026	0	0	0	0	0	0
1181	36	251	0	0	0	0	122.516	268.582	65.039	0	0	0	0	0
1182	105	110	0	0	0	0	36.608	18.616	14.416	0	0	0	0	0
1183	14	391	0	0	0	0	36.619	50.615	14.058	0	0	0	0	0
1201	22	205	0	0	0	0	0	0	0	0	0	0	0	0
1202	9	231	0	0	0	0	0	0	0	0	0	0	0	0
1203	56	138	0	0	0	0	0	0	0	0	0	0	0	0
1204	146	6	0	0	0	0	13.638	74.2	0	0	0	0	0	0
1205	14	373	0	0	0	0	0	0	0	0	52.55	0	0	0
1221	28	122	0	0	0	0	176.052	40.51	140.931	0	22.602	0	0	0

PREFERRED ALTERNATIVE LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
1484	44	16	0	0	0	0	0	0	0	0	0	0	0	0
1501	504	0	0	0	0	0	0	0	0	0	0	0	0	0
1502	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1503	262	0	0	0	0	0	0	0	0	0	0	0	1000	0
1504	73	4	0	0	0	0	0	0	0	0	0	0	0	0
1505	17	0	0	0	0	0	0	0	0	0	0	0	0	0
1506	95	42	0	0	0	0	0	0	10.301	0	0	0	0	0
1507	127	26	0	0	0	0	0	0	0	0	0	0	0	0
1508	46	30	0	0	0	0	0	0	0	0	0	0	0	0
1509	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1521	9	92	0	0	0	0	0	0	0	0	0	0	0	0
1522	63	638	0	0	0	0	28.779	36.8	0	0	0	0	0	0
1523	63	114	0	0	0	0	12.85	153.078	0	0	0	73.15	0	0
1524	27	442	31	0	0	0	203.787	0.45	0	0	0	0	0	0
1541	133	143	19	0	0	0	174.543	132.585	6.532	0	24.92	0	275	0
1561	100	96	0	0	0	0	0	0	0	0	0	17.52	0	0
1562	24	80	0	0	0	0	0	0	18.63	0	0	0	0	0
1563	52	56	0	0	0	0	1.192	27.688	0	0	31.61	0	0	0
1581	108	23	36	0	0	0	201.501	57.212	0	0	0	0	0	0
1582	1	119	30	0	0	0	84.719	5.565	0	0	0	0	0	0
1583	64	712	0	0	0	0	1.128	0.752	0	0	0	0	0	0
1601	176	294	74	0	0	0	78.341	50.121	0	0	0	0	0	0
1621	6	265	0	0	0	0	64.823	143.623	0	83.9	0	13.09	0	0
1622	0	56	0	0	0	0	20.989	13.282	0	0	0	62.5	0	0
1623	0	88	0	0	0	0	1.637	113.838	0	0	0	235.105	0	0
1624	1	12	298	0	0	0	16.258	137.253	0	0	0	18.137	0	0
1641	53	81	32	0	211.5	0	43.943	6.762	24.693	0	2.369	0	0	0
1642	87	83	0	0	0	0	4.761	23.521	0	0	5.629	49.014	0	0
1643	77	23	0	0	0	0	36.431	37.807	0	0	0	0	0	0
1644	73	104	0	0	0	0	65.172	3.572	0	0	0	0	0	0
1661	145	80	0	0	0	0	88.865	31.891	0	0	5.17	0	0	0
1662	4	349	0	0	0	0	6.251	32.726	0	0	26.775	0	0	0
1681	82	39	5	0	0	0	0	24.389	0	0	0	4.503	0	0
1682	51	43	0	0	0	0	28.221	5.786	8.783	0	0	0	0	0
1683	107	35	0	0	0	0	52.084	33.155	0	1.351	26.9	0	418	0
1684	86	51	0	0	0	0	10.767	11.052	0	0	0	0	0	0
1685	52	35	0	0	0	0	33.97	11.173	0	0	0	0	0	0

PREFERRED ALTERNATIVE LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
2101	550	0	0	0	0	0	0	0	0	0	0	0	0	0
2102	142	0	0	0	0	0	0	0	0	0	0	0	0	0
2103	51	35	0	0	0	0	0	0	0	0	0	0	0	0
2104	0	1175	0	0	0	0	178.343	0	0	0	0	0	0	0
2105	17	107	0	0	0	0	42.582	99.809	30.637	0	0	0	691	0
2106	0	362	0	0	0	0	249.201	146.501	0	0	0	0	0	0
2108	43	29	0	0	0	0	0	0	0	0	0	0	0	0
2141	0	92	0	0	0	0	24.217	0	0	0	0	0	0	362.836
2142	104	752	0	0	0	0	29.492	0	0	0	53.925	0	0	0
2143	257	48	0	0	0	0	36.63	0	0	0	0	0	0	150.667
2144	4	149	0	0	0	0	0	121.187	0	0	18.487	0	0	0
2201	0	1500	0	0	0	0	327.686	327.686	0	0	0	0	0	0
2202	68	1435	0	0	0	0	210.669	207.146	0	0	0	0	583	70.67
2221	5	0	0	0	0	0	0	0	0	0	0	0	0	0
2222	38	0	0	0	0	0	0	0	0	0	0	0	0	0
2223	817	12	0	0	0	0	0	0	0	0	0	0	0	0
2224	490	158	0	0	0	0	29.376	0	0	0	0	0	0	0
2241	0	100	185	0	0	0	235.354	0	0	0	0	0	0	587.216
2242	0	62	0	2224	0	0	351.731	0	0	0	0	0	0	30.483
2261	138	279	0	0	0	0	142.571	130.908	0	0	0	11.863	24	28.759
2281	0	0	0	0	0	0	186.386	77.021	0	0	0	24.023	0	0
2282	50	6	0	0	0	0	42.647	62.512	0	0	0	0	2500	61.492
2283	120	45	0	0	0	0	8.695	79.568	0	0	3.73	0	0	0
2284	103	50	0	0	0	0	0	0	0	0	0	0	0	0
2285	157	110	0	0	0	0	32.398	7.684	0	0	0	0	0	106.797
2301	591	1019	0	0	0	0	224.722	66.855	0	82.671	0	0	1000	0
2302	118	2	0	0	0	0	44	0	0	0	0	0	0	0
2303	0	0	0	0	0	0	708.705	34.16	398.631	0	0	0	0	0
2305	0	0	0	0	0	0	18.494	0	68.1	8.2	0	0	0	0
2306	0	14	0	0	0	0	61.641	0	210.016	2.5	21.598	0	0	0
2308	28	3	0	0	0	0	10.241	58.035	0	0	0	0	0	0
2309	49	329	0	0	0	0	5.827	0	0	0	0	0	0	0
2321	10	0	0	0	0	0	74.856	184.083	117.805	0	260.483	0	0	0
2322	0	33	0	0	0	0	170.343	20.701	0	0	0	0	0	25.843
2323	0	0	0	0	0	0	39.802	77.15	11.933	16.5	0	0	0	0
2324	0	0	0	0	0	0	145.859	80.747	32.165	0	0	0	0	0
2341	29	0	0	0	0	0	0	0	132.161	0	0	0	0	0

PREFERRED ALTERNATIVE LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
2342	52	2	0	0	0	0	0	0	239.94	0	0	0	0	0
2344	25	0	0	0	0	0	0	0	727.278	0	0	0	0	0
2345	7	15	0	0	0	0	0	0	133.856	0	0	0	0	307.292
2346	23	0	0	0	0	0	119.541	0	164.135	0	0	0	0	0
2347	1	0	0	0	0	0	380.191	33.421	231.395	0	7.055	0	0	0
2361	69	0	0	0	0	0	19.783	0	49.046	0	0	0	0	0
2362	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2363	3	2	0	0	0	0	0	0	0	0	0	0	0	0
2383	31	0	0	0	0	0	0	0	0	0	0	0	0	0
2384	24	0	0	0	0	0	0	0	0	0	0	0	0	0
2385	183	12	0	0	0	34	0	0	0	25	0	0	0	0
2386	1	0	0	0	0	0	60	0	286	0	0	0	0	0
2387	122	7	0	0	0	0	0	0	128	0	0	0	0	0
2388	284	10	0	0	0	0	0	0	0	0	0	0	0	0
2401	9	4	0	0	0	0	0	72.279	1228.724	0	0	0	0	0
2402	147	693	0	0	0	0	117.028	153.014	136.078	21.378	0	0	0	0
2403	50	39	18	0	0	0	91.377	0	952.631	0	0	0	0	0
2405	0	0	0	0	0	0	84.01	15.927	1509.798	0	0	0	0	0
2406	55	507	0	0	0	0	4.375	1.373	0	0	0	0	0	0
2407	60	49	0	0	0	0	0	0	0	0	0	0	0	0
2408	109	60	0	0	0	0	0	0	0	0	0	0	0	0
2409	23	183	0	0	0	0	0	0	0	0	0	0	0	0
2421	0	0	90	0	0	0	105.994	65.248	227.184	27.9	0	0	42	194.482
2422	1	0	0	0	0	0	118.054	126.829	60.726	0	0	0	0	0
2423	48	65	0	0	0	0	183.016	0	801.663	0	0	0	0	0
2424	0	70	0	0	0	0	131.661	13.85	481.813	0	6.697	0	0	0
2425	100	66	0	0	0	0	19.999	17.509	11.28	0	0	0	0	0
2441	8	2	0	0	0	11.193	89.658	108.743	0	30.4	0	0	338	0
2442	67	14	0	0	0	0	0	0	0	0	0	0	0	0
2443	107	30	0	0	0	2.158	0	0	0	0	4.473	0	0	0
2444	95	51	0	0	0	27.596	4.302	0	7.594	0	3.54	0	0	0
2447	103	36	0	0	0	0	13.167	2.947	35.411	0	22.578	0	0	0
2461	179	81	27	0	0	2.978	41.535	4.525	5.932	0	20.587	0	0	0
2463	34	79	0	0	0	0	12.863	6.51	0	0	0	0	0	0
2464	49	100	0	0	0	0	33.891	5.583	7.81	0	4.22	0	0	0
2465	55	56	0	0	0	0	0.693	0	0	0	0	0	0	0
2466	44	79	0	0	0	0	3.07	2.657	0	0	0	0	0	0

PREFERRED ALTERNATIVE LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
2481	78	167	0	0	0	0.361	50.919	1.31	0	0	1.486	0	0	0
2482	121	78	0	0	0	0	83.597	0.447	0	0	0	0	0	0
2483	34	46	0	0	0	0	22.162	0.586	3.16	0	0	0	359	0
2501	130	23	0	0	0	0	0	0	0	0	0	0	0	0
2502	48	4	0	0	0	64.23	0	0	0	0	0	0	0	0
2503	141	88	0	0	0	0	6.056	2.998	6.69	0	0	0	0	0
2504	73	101	0	0	0	0	15.817	9.604	19.71	0	6.758	0	0	0
2505	27	6	0	0	0	0	35.994	20.069	3.012	0	0	0	0	0
2521	48	30	0	0	0	0	0	0	0	0	0	0	0	0
2522	12	45	0	0	0	0	22.556	70.557	0	0	45	0	0	0
2523	3	18	0	0	0	0	43.693	13.485	0	0	0	0	0	0
2541	2	7	0	0	0	0.303	27.788	0	6.33	0	0	0	0	0
2542	32	58	0	0	0	0	29.508	3.191	0	0	0	0	0	0
2543	55	79	0	0	0	0	0	0	0	0	0	0	0	0
2544	21	124	10	80	0	0	46.316	47.095	0	0	21.834	0	0	0
2545	77	63	0	0	0	0	7.864	0.025	0	0	0	0	0	0
2561	8	41	0	0	0	0	0	0	0	0	0	0	0	0
2562	10	17	0	0	0	0	0.766	9.099	0	0	6.785	0	0	0
2563	0	18	0	0	0	0	43.68	2.437	0.94	0	0	0	0	0
2564	0	5	0	0	0	0	20.809	2.523	10.466	0	0	0	0	0
2565	1	16	78	0	0	0	17.881	4.825	0	0	0	0	0	0
2566	8	86	0	0	0	0	8.939	1.324	0	0	0	0	0	0
2571	22	72	0	0	0	0	5.872	3.092	0	0	0	0	0	0
2572	17	68	0	0	0	0	4.752	3.604	18.177	0	0	0	0	0
2573	0	2	0	0	0	0	0	0.164	16.889	0	0	0	0	0
2574	0	1	0	0	0	0	0	0.09	9.308	0	0	0	0	0
2575	2	88	0	0	0	0	6.862	1.98	17.726	0	18.727	0	0	0
2576	9	36	0	0	0	0	3.143	1.593	0	0	12.338	0	0	0
2578	9	26	0	0	0	0	0	0	0	0	0	0	0	0
2579	7	17	0	0	0	0	0	0	0	0	0	0	0	0
2581	0	12	0	20034	0	2.948	47.569	2.791	0	0	17.267	0	0	0
2582	1	4	0	0	0	0	4.431	4.23	0	0	2.947	0	0	0
2583	0	10	0	0	0	0	39.789	4.815	0	0	0	0	0	0
2584	0	19	0	0	0	1.591	36.355	24.352	0	0	2.047	0	0	0
2585	15	56	0	0	0	0	4.361	25.823	0	0	2.225	0	0	0
2586	0	17	43	0	0	0	51.21	22.581	0	0	6.338	0	0	0
2587	14	88	0	0	0	0	8.453	14.968	0	0	6.675	0	0	0

PREFERRED ALTERNATIVE LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSACE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
2621	3	11	0	0	0	0	3.922	1.306	38.804	0	0	0	0	0
2622	0	7	0	0	0	0	27.947	0.706	13.107	0	0	0	0	0
2623	17	27	0	0	0	0	10.787	0.227	9.966	0	0	0	0	0
2624	11	36	0	0	0	0	0	0	0	0	0	0	0	0
2625	13	18	0	0	0	0	0	0	0	0	0	0	0	0
2626	13	42	0	0	0	0	0	0	0	0	0	0	0	0
2641	45	252	0	0	0	0	31.204	3.607	0	0	0	0	0	0
2642	4	349	0	0	0	0	15.213	0	0	0	0	0	0	0
2643	53	490	0	0	0	0	34.421	0	25.994	0	0	0	0	0
2661	2	7	0	0	0	0	13.101	0.331	0.993	0	0	0	0	0
2662	0	26	0	0	0	0	24.555	0.07	7.182	0	0	0	0	0
2663	5	35	0	0	0	1.126	23.593	4.215	19.555	13.8	0	0	0	0
2664	18	192	0	0	0	0	24.072	21.83	28.805	0	0	0	0	0
2665	26	114	0	0	0	0	5.099	0	81.229	4.5	0	0	0	0
2666	67	8	0	0	0	0	0	0	0	0	0	0	0	0
2667	8	10	0	0	0	0	13.026	0	0	13.36	0	0	0	0
2668	13	103	0	0	0	0	23.589	2.354	0	0	0	0	0	0
2669	18	101	0	0	0	0	0	0	0	0	0	0	475	0
2681	326	111	0	0	0	0	1.133	0.126	170	0	0	0	0	0
2682	54	3	0	0	0	0	0	0	0	0	0	0	0	0
2683	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2684	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	16	0	0	0	0	0	0	0	0	0	0	0	0	0
2702	6	4	0	0	0	0	0	0	0	0	0	0	0	0
2703	10	2	0	0	0	0	0	0	0	0	0	0	0	0
2704	7	0	0	0	0	0	0	0	0	0	0	0	0	0
2705	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2721	12	2	0	0	12.2	0	11.914	0	61.983	0	0	0	0	0
2722	11	14	0	0	0	0	1.777	72.927	439.373	0	0	0	0	0
2723	19	7	0	0	0	0	113.776	62.717	302.904	0	12.318	0	0	0
2724	30	4	0	0	0	0	17.106	100.953	152.507	0	0	0	0	0
2725	36	11	0	0	0	0	50.309	0	133.446	0	0	0	0	0
2726	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2741	6	278	0	0	0	0	74.561	5.658	36.957	0	0	0	0	0
2742	25	719	0	0	0	0	18.439	12.064	54.474	0	0	0	0	0
2744	3	109	0	0	0	0	74.208	68.715	142.882	0	16.863	0	0	0
2745	18	219	0	0	0	0	70.861	36.296	209.353	0	0	0	0	0

PREFERRED ALTERNATIVE LAND USE

ZONE	SFDU	MFDU	HOTEL	UNIVERSITY	AGRICULTURE	PARKOPENSOURCE	RETAIL	SERVICE	MANUFACTURE	RECREATION	PUBLIC	MEDICARE	EDUCATION	REGION_RETAIL
23817	39	2	0	0	0	0	0	0	0	0	0	0	0	0
23818	13	526	0	0	0	0	0	76.872	606.031	63.161	0	0	0	0
23819	82	345	0	0	0	0	0	0	0	0	0	0	0	602.69
25710	5	27	0	0	0	0	0	0	0	0	0	0	0	0
25711	1	4	0	0	0	0	0	0	0	0	0	0	0	0
26610	4	0	0	0	0	0	0	0	0	0	0	0	0	0
26612	82	266	0	0	0	0	20.163	0.023	76.605	0	0	0	0	0
26613	27	82	0	0	0	0	19.39	1.125	3.377	0	0	0	0	0
27410	155	0	0	0	0	0	0	0	0	0	0	0	0	0
27411	201	50	0	0	0	0	0	0	0	0	0	0	682	0
27810	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70011	35	2	0	0	0	0	0	0	0	0	0	0	0	0
70013	26	0	0	0	0	0	0	0	0	0	0	0	0	0
70014	0	54	0	0	0	0	376.076	0	74.74	0	0	0	0	0
70015	0	20	0	0	0	0	106.707	0	127.6	0	0	0	0	0
100001	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100002	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100004	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100007	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100008	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100009	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100010	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Fehr & Peers, 2010

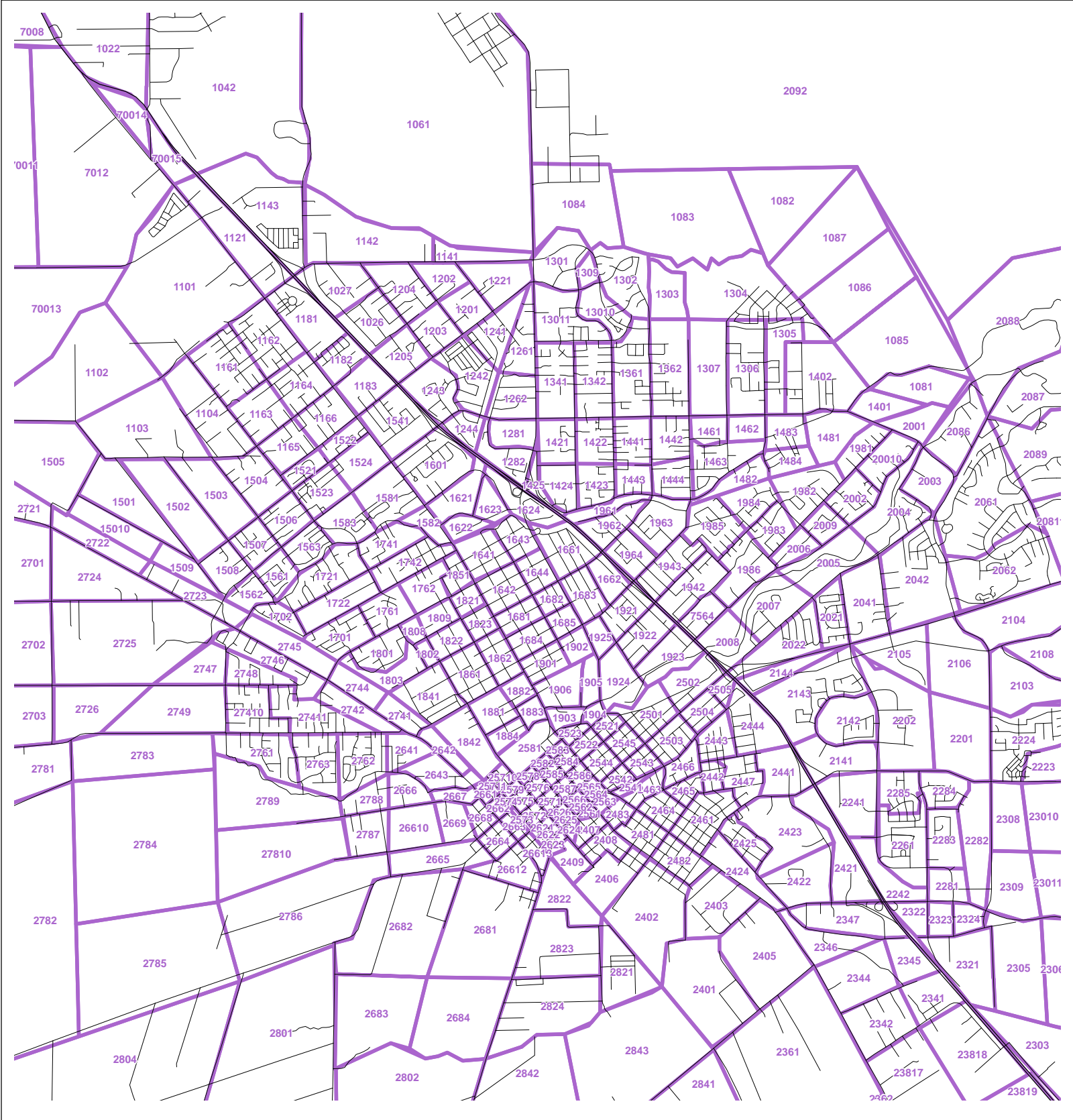
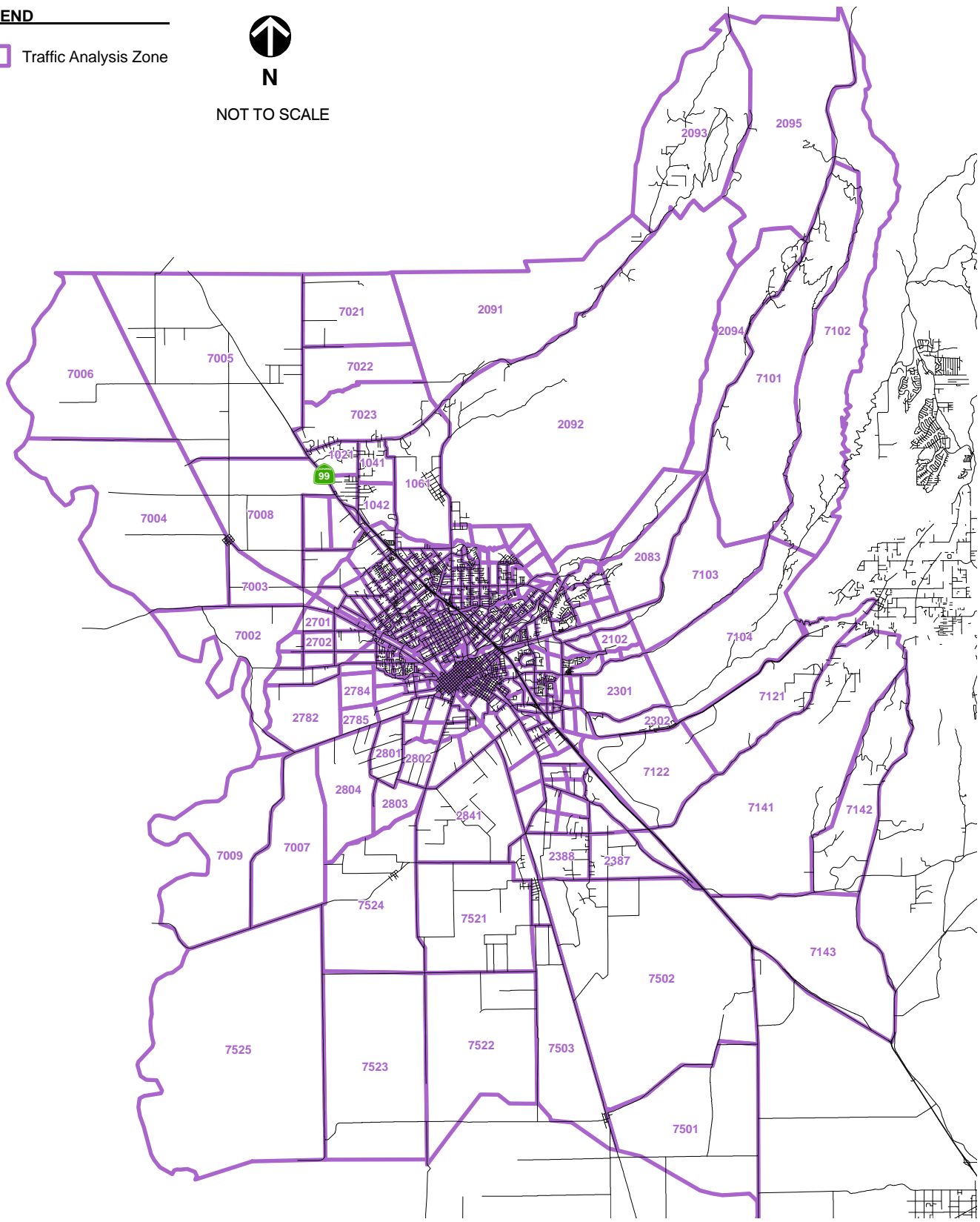
LEGEND

100 Traffic Analysis Zone



N

NOT TO SCALE



























FEHR & PEERS
TRANSPORTATION CONSULTANTS

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**CHICO TRAVEL DEMAND FORECASTING MODEL
TRAFFIC ANALYSIS ZONES MAP**

HCM Signalized Intersection Capacity Analysis
1: E 1st Ave & Mangrove Ave

Existing Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	62	403	78	194	430	123	86	334	96	104	481	53
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	438	85	211	467	134	93	363	104	113	523	58
RTOR Reduction (vph)	0	0	39	0	0	73	0	0	75	0	0	36
Lane Group Flow (vph)	67	438	46	211	467	61	93	363	29	113	523	22
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.1	24.2	24.2	12.8	32.9	32.9	6.5	16.4	16.4	6.9	16.8	16.8
Effective Green, g (s)	3.2	24.1	24.1	11.9	32.8	32.8	5.6	16.7	16.7	6.0	17.1	17.1
Actuated g/C Ratio	0.04	0.32	0.32	0.16	0.44	0.44	0.07	0.22	0.22	0.08	0.23	0.23
Clearance Time (s)	3.1	3.9	3.9	3.1	3.9	3.9	3.1	4.3	4.3	3.1	4.3	4.3
Vehicle Extension (s)	1.0	1.5	1.5	1.0	1.5	1.5	1.5	2.5	2.5	1.0	2.5	2.5
Lane Grp Cap (vph)	76	601	511	282	818	695	133	791	354	142	810	362
v/s Ratio Prot	0.04	c0.24		c0.12	0.25		0.05	0.10		c0.06	c0.15	
v/s Ratio Perm			0.03			0.04			0.02			0.01
v/c Ratio	0.88	0.73	0.09	0.75	0.57	0.09	0.70	0.46	0.08	0.80	0.65	0.06
Uniform Delay, d1	35.6	22.4	17.7	30.0	15.7	12.2	33.7	25.1	22.9	33.7	26.1	22.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	63.2	3.7	0.0	9.1	0.6	0.0	12.2	0.3	0.1	24.2	1.6	0.1
Delay (s)	98.8	26.2	17.7	39.1	16.3	12.2	45.9	25.4	23.0	58.0	27.6	22.6
Level of Service	F	C	B	D	B	B	D	C	C	E	C	C
Approach Delay (s)		33.2			21.5			28.4			32.1	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			28.3	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			74.7	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			63.4%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												
















HCM Signalized Intersection Capacity Analysis
2: E 5th St & Mangrove Ave

Existing Conditions
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.96		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1804		1770	1792		1770	3400		1770	3480	
Flt Permitted	0.25	1.00		0.27	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	458	1804		508	1792		1770	3400		1770	3480	
Volume (vph)	85	319	86	202	317	109	64	398	142	92	476	60
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	347	93	220	345	118	70	433	154	100	517	65
RTOR Reduction (vph)	0	11	0	0	14	0	0	39	0	0	10	0
Lane Group Flow (vph)	92	429	0	220	449	0	70	548	0	100	572	0
Turn Type	Perm		Perm		Prot		Prot					
Protected Phases	4		8		5		2		1		6	
Permitted Phases	4		8									
Actuated Green, G (s)	30.7	30.7		30.7	30.7		6.0	37.6		6.7	38.3	
Effective Green, g (s)	30.3	30.3		30.3	30.3		5.1	37.9		5.8	38.6	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.06	0.44		0.07	0.45	
Clearance Time (s)	3.6	3.6		3.6	3.6		3.1	4.3		3.1	4.3	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	161	636		179	631		105	1498		119	1562	
v/s Ratio Prot		0.24			0.25		0.04	0.16		c0.06	c0.16	
v/s Ratio Perm	0.20			c0.43								
v/c Ratio	0.57	0.67		1.23	0.71		0.67	0.37		0.84	0.37	
Uniform Delay, d1	22.6	23.7		27.8	24.1		39.6	16.0		39.6	15.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	2.2		142.2	3.2		11.7	0.7		37.3	0.7	
Delay (s)	25.6	25.9		170.0	27.2		51.3	16.7		77.0	16.3	
Level of Service	C			F	C		D	B		E	B	
Approach Delay (s)		25.8			73.2			20.4			25.2	
Approach LOS		C			E			C			C	
Intersection Summary												
HCM Average Control Delay			36.9	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			86.0	Sum of lost time (s)				8.0				
Intersection Capacity Utilization			67.2%	ICU Level of Service				C				
Analysis Period (min)			15									
c Critical Lane Group												



























HCM Signalized Intersection Capacity Analysis
3: E 20th Street & Park Ave

Existing Conditions
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	 		 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1583	3539	1583	1770	3539
Volume (vph)	166	153	424	92	183	391
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	180	166	461	100	199	425
RTOR Reduction (vph)	0	135	0	63	0	0
Lane Group Flow (vph)	180	31	461	37	199	425
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	8.0	8.0	16.8	16.8	9.4	28.8
Effective Green, g (s)	8.5	8.5	16.9	16.9	8.4	29.3
Actuated g/C Ratio	0.19	0.19	0.37	0.37	0.18	0.64
Clearance Time (s)	4.5	4.5	4.1	4.1	3.0	4.5
Vehicle Extension (s)	3.5	3.5	3.0	3.0	0.5	3.0
Lane Grp Cap (vph)	637	294	1306	584	325	2264
v/s Ratio Prot	c0.05		c0.13		c0.11	0.12
v/s Ratio Perm		0.02		0.02		
v/c Ratio	0.28	0.10	0.35	0.06	0.61	0.19
Uniform Delay, d1	16.0	15.5	10.5	9.3	17.2	3.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2	0.0	2.4	0.0
Delay (s)	16.3	15.7	10.6	9.4	19.6	3.4
Level of Service	B	B	B	A	B	A
Approach Delay (s)	16.0		10.4			8.6
Approach LOS	B		B			A
Intersection Summary						
HCM Average Control Delay			10.9		HCM Level of Service	B
HCM Volume to Capacity ratio			0.40			
Actuated Cycle Length (s)			45.8		Sum of lost time (s)	12.0
Intersection Capacity Utilization			37.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						





























HCM Signalized Intersection Capacity Analysis
4: E 20th Street & Dr Martin Luther King Jr Pkwy

Existing Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 						 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	3433	3486		1770	1863	1583	1770	1655	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	3433	3486		1770	1863	1583	1770	1655	
Volume (vph)	20	316	78	107	439	49	49	5	52	32	7	21
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	343	85	116	477	53	53	5	57	35	8	23
RTOR Reduction (vph)	0	0	55	0	8	0	0	0	52	0	22	0
Lane Group Flow (vph)	22	343	30	116	522	0	53	5	5	35	9	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	6.3	15.3	15.3	3.7	12.8		8.3	4.5	4.5	6.5	2.7	
Effective Green, g (s)	5.3	15.4	15.4	2.7	12.8		7.3	3.5	3.5	5.5	1.7	
Actuated g/C Ratio	0.12	0.36	0.36	0.06	0.30		0.17	0.08	0.08	0.13	0.04	
Clearance Time (s)	3.0	4.1	4.1	3.0	4.0		3.0	3.0	3.0	3.0	3.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	218	1265	566	215	1035		300	151	129	226	65	
v/s Ratio Prot	0.01	c0.10		c0.03	c0.15		c0.03	0.00		0.02	c0.01	
v/s Ratio Perm			0.02						0.00			
v/c Ratio	0.10	0.27	0.05	0.54	0.50		0.18	0.03	0.04	0.15	0.14	
Uniform Delay, d1	16.8	9.9	9.1	19.6	12.5		15.3	18.2	18.2	16.7	20.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.0	0.0	1.3	0.1		0.1	0.0	0.0	0.1	0.4	
Delay (s)	16.9	9.9	9.1	20.9	12.7		15.4	18.3	18.3	16.8	20.3	
Level of Service	B	A	A	C	B		B	B	B	B	C	
Approach Delay (s)		10.1			14.1			17.0			18.5	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			13.2			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			43.1			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			37.2%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Eaton Road & Cohasset Road

Existing Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	113	105	88	8	91	95	84	364	8	24	225	61
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	114	96	9	99	103	91	396	9	26	245	66
RTOR Reduction (vph)	0	0	76	0	0	83	0	0	6	0	0	44
Lane Group Flow (vph)	123	114	20	9	99	20	91	396	3	26	245	22
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.2	10.2	10.2	6.5	9.5	9.5	3.9	14.6	14.6	6.0	16.7	16.7
Effective Green, g (s)	6.2	11.2	11.2	5.5	10.5	10.5	2.9	15.6	15.6	5.0	17.7	17.7
Actuated g/C Ratio	0.12	0.21	0.21	0.10	0.20	0.20	0.05	0.29	0.29	0.09	0.33	0.33
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.5	0.5	2.5	2.5	0.5	3.0	3.0	0.5	3.0	3.0
Lane Grp Cap (vph)	206	744	333	183	697	312	96	1036	463	166	1175	526
v/s Ratio Prot	c0.07	c0.03		0.01	0.03		c0.05	c0.11		0.01	0.07	
v/s Ratio Perm			0.01			0.01			0.00			0.01
v/c Ratio	0.60	0.15	0.06	0.05	0.14	0.07	0.95	0.38	0.01	0.16	0.21	0.04
Uniform Delay, d1	22.4	17.2	16.8	21.5	17.7	17.4	25.1	15.0	13.4	22.2	12.8	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	0.1	0.1	0.0	0.1	0.1	73.6	0.2	0.0	0.2	0.1	0.0
Delay (s)	26.2	17.2	16.9	21.6	17.7	17.5	98.7	15.2	13.4	22.4	12.9	12.1
Level of Service	C	B	B	C	B	B	F	B	B	C	B	B
Approach Delay (s)		20.5			17.8			30.5			13.4	
Approach LOS		C			B			C			B	
Intersection Summary												
HCM Average Control Delay			22.0	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.34									
Actuated Cycle Length (s)			53.3	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			37.2%	ICU Level of Service				A				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 6: Eaton Road & Hicks Lane

Existing Conditions
 AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Sign Control		Stop	Stop		Stop	
Volume (vph)	39	309	339	30	125	94
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	336	368	33	136	102
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	378	401	238			
Volume Left (vph)	42	0	136			
Volume Right (vph)	0	33	102			
Hadj (s)	0.06	-0.01	-0.11			
Departure Headway (s)	5.3	5.2	5.7			
Degree Utilization, x	0.55	0.58	0.38			
Capacity (veh/h)	656	672	569			
Control Delay (s)	14.6	15.0	12.2			
Approach Delay (s)	14.6	15.0	12.2			
Approach LOS	B	B	B			
Intersection Summary						
Delay			14.2			
HCM Level of Service			B			
Intersection Capacity Utilization			60.8%	ICU Level of Service	B	
Analysis Period (min)			15			

























HCM Signalized Intersection Capacity Analysis
7: Cohasset Road & Esplanade

Existing Conditions
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations				↔		↔		↕		↔	↕	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)				4.0		4.0		4.0		4.0	4.0		
Lane Util. Factor				0.97		1.00		0.95		1.00	0.95		
Frt				1.00		0.85		0.94		1.00	1.00		
Flt Protected				0.95		1.00		1.00		0.95	1.00		
Satd. Flow (prot)				3433		1583		3338		1770	3539		
Flt Permitted				0.95		1.00		1.00		0.95	1.00		
Satd. Flow (perm)				3433		1583		3338		1770	3539		
Volume (vph)	0	0	0	177	0	151	0	588	358	184	628	0	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	0	0	192	0	164	0	639	389	200	683	0	
RTOR Reduction (vph)	0	0	0	0	0	140	0	64	0	0	0	0	
Lane Group Flow (vph)	0	0	0	192	0	24	0	964	0	200	683	0	
Turn Type				Prot		custom				Prot			
Protected Phases				3				2		1	6		
Permitted Phases						8							
Actuated Green, G (s)				8.3		7.3		27.0		8.6	38.6		
Effective Green, g (s)				8.3		8.3		28.0		7.6	39.6		
Actuated g/C Ratio				0.15		0.15		0.50		0.14	0.71		
Clearance Time (s)				4.0		5.0		5.0		3.0	5.0		
Vehicle Extension (s)				1.5		3.5		2.0		1.2	2.0		
Lane Grp Cap (vph)				510		235		1672		241	2507		
v/s Ratio Prot				c0.06				c0.29		c0.11	0.19		
v/s Ratio Perm						0.02							
v/c Ratio				0.38		0.10		0.58		0.83	0.27		
Uniform Delay, d1				21.5		20.6		9.8		23.5	2.9		
Progression Factor				1.00		1.00		1.00		1.00	1.00		
Incremental Delay, d2				0.2		0.2		0.3		19.6	0.0		
Delay (s)				21.6		20.8		10.1		43.1	3.0		
Level of Service				C		C		B		D	A		
Approach Delay (s)		0.0			21.3			10.1			12.1		
Approach LOS		A			C			B			B		
Intersection Summary													
HCM Average Control Delay			12.6									HCM Level of Service	B
HCM Volume to Capacity ratio			0.58										
Actuated Cycle Length (s)			55.9									Sum of lost time (s)	12.0
Intersection Capacity Utilization			53.0%									ICU Level of Service	A
Analysis Period (min)			15										
c Critical Lane Group													

















HCM Signalized Intersection Capacity Analysis
8: Vallombrosa Ave & Mangrove Ave

Existing Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1743	1583	1681	1770	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.87	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1545	1583	1681	1770	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	224	123	127	164	179	70	226	352	141	79	304	396
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	243	134	138	178	195	76	246	383	153	86	330	430
RTOR Reduction (vph)	0	0	80	0	0	44	0	0	114	0	0	364
Lane Group Flow (vph)	183	194	58	178	195	32	246	383	39	86	330	66
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.3	60.1	45.8	14.0	59.5	45.5	18.4	27.8	27.8	7.6	17.0	17.0
Effective Green, g (s)	13.3	58.6	45.3	13.0	58.0	45.0	17.4	27.3	27.3	6.6	16.5	16.5
Actuated g/C Ratio	0.12	0.54	0.42	0.12	0.54	0.42	0.16	0.25	0.25	0.06	0.15	0.15
Clearance Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5
Vehicle Extension (s)	0.5	1.0	1.0	0.5	1.0	1.0	2.0	3.0	3.0	1.0	3.0	3.0
Lane Grp Cap (vph)	207	861	663	202	949	658	285	893	399	108	540	241
v/s Ratio Prot	c0.11	0.03		0.11	0.02		c0.14	0.11		0.05	c0.09	
v/s Ratio Perm		c0.09	0.04		0.09	0.02			0.02			0.04
v/c Ratio	0.88	0.23	0.09	0.88	0.21	0.05	0.86	0.43	0.10	0.80	0.61	0.27
Uniform Delay, d1	46.7	12.9	19.0	46.8	13.1	18.8	44.2	33.9	31.0	50.1	42.9	40.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	32.2	0.0	0.0	32.3	0.0	0.0	22.0	0.3	0.1	30.3	2.1	0.6
Delay (s)	78.9	13.0	19.0	79.1	13.1	18.8	66.2	34.2	31.1	80.5	44.9	41.2
Level of Service	E	B	B	E	B	B	E	C	C	F	D	D
Approach Delay (s)		38.0			40.3			43.7			46.6	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM Average Control Delay			42.9			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			108.2			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			56.5%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
9: Hegan Lane & Midway

Existing Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	4.0			4.0	4.0
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.96					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1763					1770	1863			1863	1583
Flt Permitted		0.74					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1367					1770	1863			1863	1583
Volume (vph)	416	0	32	0	0	0	39	445	0	0	408	286
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	452	0	35	0	0	0	42	484	0	0	443	311
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	152
Lane Group Flow (vph)	0	481	0	0	0	0	42	484	0	0	443	159
Turn Type	Perm			Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)		16.1					1.4	21.8			16.4	16.4
Effective Green, g (s)		16.1					1.4	21.8			16.4	16.4
Actuated g/C Ratio		0.35					0.03	0.47			0.36	0.36
Clearance Time (s)		4.0					4.0	4.0			4.0	4.0
Vehicle Extension (s)		3.0					3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		479					54	885			666	566
v/s Ratio Prot							0.02	c0.26			c0.24	
v/s Ratio Perm		c0.35										0.10
v/c Ratio		1.00					0.78	0.55			0.67	0.28
Uniform Delay, d1		14.9					22.1	8.5			12.4	10.5
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		42.2					49.7	2.4			5.2	1.2
Delay (s)		57.1					71.8	11.0			17.6	11.8
Level of Service		E					E	B			B	B
Approach Delay (s)		57.1			0.0			15.8			15.2	
Approach LOS		E			A			B			B	
Intersection Summary												
HCM Average Control Delay			27.0				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			45.9				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			61.7%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 10: E Park Ave & Park Ave

Existing Conditions
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕		↕	↕	↕		↕	↕	↕	↕	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)				4.0	4.0	4.0		4.0	4.0	4.0	4.0		
Lane Util. Factor				0.95	0.95	1.00		1.00	1.00	0.95	0.95		
Frt				1.00	1.00	0.85		1.00	0.85	1.00	1.00		
Flt Protected				0.95	0.95	1.00		1.00	1.00	0.95	0.99		
Satd. Flow (prot)				1681	1681	1583		1863	1583	1681	1744		
Flt Permitted				0.95	0.68	1.00		1.00	1.00	0.95	0.55		
Satd. Flow (perm)				1681	1200	1583		1863	1583	1681	979		
Volume (vph)	0	0	0	478	0	310	0	244	406	411	232	0	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	0	0	520	0	337	0	265	441	447	252	0	
RTOR Reduction (vph)	0	0	0	0	0	190	0	0	346	0	0	0	
Lane Group Flow (vph)	0	0	0	260	260	147	0	265	95	341	358	0	
Turn Type	Prot			Prot			Perm			Prot			
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases						8			2				
Actuated Green, G (s)				40.8	45.7	45.7		22.1	22.1	24.1	51.7		
Effective Green, g (s)				40.8	46.7	46.7		23.1	23.1	25.1	52.2		
Actuated g/C Ratio				0.38	0.44	0.44		0.22	0.22	0.23	0.49		
Clearance Time (s)				4.0	5.0	5.0		5.0	5.0	5.0	4.5		
Vehicle Extension (s)				1.0	3.5	3.5		2.5	2.5	1.0	3.5		
Lane Grp Cap (vph)				642	708	692		403	342	395	658		
v/s Ratio Prot				c0.15	0.14			c0.14		c0.20	0.13		
v/s Ratio Perm					c0.02	0.09			0.06		0.14		
v/c Ratio				0.40	0.37	0.21		0.66	0.28	0.86	0.54		
Uniform Delay, d1				24.2	20.2	18.7		38.3	35.0	39.3	19.1		
Progression Factor				1.00	1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2				0.2	0.4	0.2		3.4	0.3	16.9	1.0		
Delay (s)				24.3	20.6	18.9		41.7	35.3	56.1	20.1		
Level of Service				C	C	B		D	D	E	C		
Approach Delay (s)		0.0			21.0			37.7			37.7		
Approach LOS		A			C			D			D		
Intersection Summary													
HCM Average Control Delay			31.4		HCM Level of Service						C		
HCM Volume to Capacity ratio			0.58										
Actuated Cycle Length (s)			106.9		Sum of lost time (s)						12.0		
Intersection Capacity Utilization			53.6%		ICU Level of Service						A		
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
 11: E 20th Street & Forest Ave

Existing Conditions
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3212		1770	3539	1583	1770	3539	1583	1770	3296	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3212		1770	3539	1583	1770	3539	1583	1770	3296	
Volume (vph)	158	154	247	67	304	160	186	121	8	110	250	212
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	172	167	268	73	330	174	202	132	9	120	272	230
RTOR Reduction (vph)	0	188	0	0	0	134	0	0	7	0	126	0
Lane Group Flow (vph)	172	247	0	73	330	40	202	132	2	120	376	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	8.5	17.0		4.3	12.8	12.8	9.6	15.2	15.2	6.9	12.5	
Effective Green, g (s)	7.5	17.5		3.3	13.3	13.3	8.6	15.7	15.7	5.9	13.0	
Actuated g/C Ratio	0.13	0.30		0.06	0.23	0.23	0.15	0.27	0.27	0.10	0.22	
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	227	963		100	806	361	261	951	426	179	734	
v/s Ratio Prot	c0.10	0.08		0.04	c0.09		c0.11	c0.04		0.07	c0.11	
v/s Ratio Perm						0.03			0.00			
v/c Ratio	0.76	0.26		0.73	0.41	0.11	0.77	0.14	0.01	0.67	0.51	
Uniform Delay, d1	24.6	15.5		27.1	19.2	17.9	24.0	16.2	15.6	25.3	19.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.1	0.1		20.8	0.1	0.0	12.2	0.0	0.0	7.5	0.3	
Delay (s)	36.6	15.6		47.9	19.3	17.9	36.2	16.2	15.6	32.8	20.2	
Level of Service	D	B		D	B	B	D	B	B	C	C	
Approach Delay (s)		21.5			22.5			28.0			22.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			23.1				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			58.4				Sum of lost time (s)		20.0			
Intersection Capacity Utilization			54.5%				ICU Level of Service		A			
Analysis Period (min)			15									
c	Critical Lane Group											























HCM Signalized Intersection Capacity Analysis
 12: Nord Ave (CA-32) & W 2nd St

Existing Conditions
 AM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.98			0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1770	3489		1770	3463			1760			1819	1583
Flt Permitted	0.42	1.00		0.35	1.00			0.89			0.82	1.00
Satd. Flow (perm)	777	3489		655	3463			1590			1523	1583
Volume (vph)	111	625	65	27	488	82	54	91	68	46	50	91
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	679	71	29	530	89	59	99	74	50	54	99
RTOR Reduction (vph)	0	14	0	0	24	0	0	53	0	0	0	75
Lane Group Flow (vph)	121	736	0	29	595	0	0	179	0	0	104	24
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	23.0	23.0		23.0	23.0			9.7			9.7	9.7
Effective Green, g (s)	23.0	23.0		23.0	23.0			9.7			9.7	9.7
Actuated g/C Ratio	0.57	0.57		0.57	0.57			0.24			0.24	0.24
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	439	1972		370	1957			379			363	377
v/s Ratio Prot		c0.21			0.17							
v/s Ratio Perm	0.16			0.04				c0.11			0.07	0.01
v/c Ratio	0.28	0.37		0.08	0.30			0.47			0.29	0.06
Uniform Delay, d1	4.6	4.9		4.0	4.6			13.3			12.7	12.0
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	1.6	0.5		0.4	0.4			0.9			0.4	0.1
Delay (s)	6.1	5.4		4.4	5.0			14.2			13.1	12.1
Level of Service	A	A		A	A			B			B	B
Approach Delay (s)		5.5			5.0			14.2			12.6	
Approach LOS		A			A			B			B	
Intersection Summary												
HCM Average Control Delay			7.1			HCM Level of Service					A	
HCM Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			40.7			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			51.3%			ICU Level of Service					A	
Analysis Period (min)			15									
c Critical Lane Group												





























HCM Signalized Intersection Capacity Analysis
 13: E Lassen Ave & Esplanade

Existing Conditions
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.93		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1803		1770	1736		1770	3397		1770	3519	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1803		1770	1736		1770	3397		1770	3519	
Volume (vph)	16	153	41	160	110	91	14	336	123	92	392	16
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	166	45	174	120	99	15	365	134	100	426	17
RTOR Reduction (vph)	0	8	0	0	22	0	0	35	0	0	3	0
Lane Group Flow (vph)	17	203	0	174	197	0	15	464	0	100	440	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.7	11.0		8.0	18.3		0.7	11.4		4.1	14.8	
Effective Green, g (s)	0.2	11.6		7.5	18.9		0.2	12.0		3.6	15.4	
Actuated g/C Ratio	0.00	0.23		0.15	0.37		0.00	0.24		0.07	0.30	
Clearance Time (s)	3.5	4.6		3.5	4.6		3.5	4.6		3.5	4.6	
Vehicle Extension (s)	1.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	7	413		262	647		7	804		126	1069	
v/s Ratio Prot	0.01	c0.11		c0.10	0.11		0.01	c0.14		c0.06	c0.13	
v/s Ratio Perm												
v/c Ratio	2.43	0.49		0.66	0.30		2.14	0.58		0.79	0.41	
Uniform Delay, d1	25.2	17.0		20.4	11.3		25.2	17.1		23.2	14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	941.4	0.3		4.8	0.1		817.6	1.0		26.5	0.3	
Delay (s)	966.6	17.3		25.3	11.3		842.8	18.1		49.7	14.3	
Level of Service	F	B		C	B		F	B		D	B	
Approach Delay (s)		88.1			17.5			42.2			20.8	
Approach LOS		F			B			D			C	
Intersection Summary												
HCM Average Control Delay			35.7				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			50.7			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			51.1%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

























HCM Signalized Intersection Capacity Analysis
 14: E Park Ave & Notre Dame Blvd

Existing Conditions
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  		 				 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.91		0.97	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	5052		3433	1754		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	5052		3433	1754		1770	1863	1583
Volume (vph)	307	644	329	89	1192	55	251	53	34	106	64	251
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	334	700	358	97	1296	60	273	58	37	115	70	273
RTOR Reduction (vph)	0	0	187	0	4	0	0	20	0	0	0	164
Lane Group Flow (vph)	334	700	171	97	1352	0	273	75	0	115	70	109
Turn Type	Prot		Perm	Prot			Prot			Prot		custom
Protected Phases	5	2		1	6		3	8		7		4
Permitted Phases			2									6
Actuated Green, G (s)	12.2	34.1	34.1	6.4	28.2		10.0	9.3		7.4	6.2	28.2
Effective Green, g (s)	11.8	35.3	35.3	6.0	29.5		9.6	9.4		7.0	6.8	29.5
Actuated g/C Ratio	0.16	0.48	0.48	0.08	0.40		0.13	0.13		0.09	0.09	0.40
Clearance Time (s)	3.6	5.2	5.2	3.6	5.3		3.6	4.1		3.6	4.6	5.3
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	550	1695	758	144	2022		447	224		168	172	634
v/s Ratio Prot	c0.10	0.20		0.05	c0.27		c0.08	c0.04		0.06	0.04	
v/s Ratio Perm			0.11									0.07
v/c Ratio	0.61	0.41	0.23	0.67	0.67		0.61	0.33		0.68	0.41	0.17
Uniform Delay, d1	28.8	12.5	11.2	32.9	18.1		30.3	29.3		32.3	31.5	14.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.3	0.1	0.1	9.4	0.7		1.7	0.3		8.8	0.6	0.0
Delay (s)	30.1	12.5	11.3	42.3	18.8		32.0	29.6		41.1	32.1	14.3
Level of Service	C	B	B	D	B		C	C		D	C	B
Approach Delay (s)		16.4			20.3			31.4			23.7	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			20.4				HCM Level of Service					C
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			73.7				Sum of lost time (s)				16.0	
Intersection Capacity Utilization			57.0%				ICU Level of Service				B	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 1: E 1st Ave & Mangrove Ave

Existing Conditions
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	115	414	103	181	449	114	170	702	151	193	753	93
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	450	112	197	488	124	185	763	164	210	818	101
RTOR Reduction (vph)	0	0	52	0	0	77	0	0	52	0	0	36
Lane Group Flow (vph)	125	450	60	197	488	47	185	763	112	210	818	65
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	8.6	27.3	27.3	13.2	31.9	31.9	11.3	26.5	26.5	14.0	29.2	29.2
Effective Green, g (s)	7.7	27.2	27.2	12.3	31.8	31.8	10.4	26.8	26.8	13.1	29.5	29.5
Actuated g/C Ratio	0.08	0.29	0.29	0.13	0.33	0.33	0.11	0.28	0.28	0.14	0.31	0.31
Clearance Time (s)	3.1	3.9	3.9	3.1	3.9	3.9	3.1	4.3	4.3	3.1	4.3	4.3
Vehicle Extension (s)	1.0	1.5	1.5	1.0	1.5	1.5	1.5	2.5	2.5	1.0	2.5	2.5
Lane Grp Cap (vph)	143	531	451	228	621	528	193	994	445	243	1094	490
v/s Ratio Prot	0.07	0.24		c0.11	c0.26		0.10	0.22		c0.12	c0.23	
v/s Ratio Perm			0.04			0.03			0.07			0.04
v/c Ratio	0.87	0.85	0.13	0.86	0.79	0.09	0.96	0.77	0.25	0.86	0.75	0.13
Uniform Delay, d1	43.4	32.1	25.3	40.7	28.7	21.8	42.3	31.4	26.5	40.3	29.6	23.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	39.5	11.5	0.0	26.3	6.0	0.0	51.9	3.5	0.2	25.0	2.7	0.1
Delay (s)	82.8	43.6	25.4	67.0	34.7	21.9	94.2	34.9	26.8	65.3	32.3	23.8
Level of Service	F	D	C	E	C	C	F	C	C	E	C	C
Approach Delay (s)		47.8			40.6			43.6			37.7	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM Average Control Delay			41.9	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			95.4	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			75.4%	ICU Level of Service				D				
Analysis Period (min)			15									
c Critical Lane Group												
















HCM Signalized Intersection Capacity Analysis
2: E 5th St & Mangrove Ave

Existing Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1788		1770	1771		1770	3481		1770	3508	
Flt Permitted	0.26	1.00		0.32	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	477	1788		589	1771		1770	3481		1770	3508	
Volume (vph)	38	163	60	76	165	81	59	853	105	124	932	59
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	177	65	83	179	88	64	927	114	135	1013	64
RTOR Reduction (vph)	0	17	0	0	21	0	0	8	0	0	3	0
Lane Group Flow (vph)	41	225	0	83	246	0	64	1033	0	135	1074	0
Turn Type	Perm		Perm		Prot		Prot					
Protected Phases	4		8		5		2		1		6	
Permitted Phases	4		8									
Actuated Green, G (s)	16.1	16.1		16.1	16.1		5.8	53.1		9.8	57.1	
Effective Green, g (s)	15.7	15.7		15.7	15.7		4.9	53.4		8.9	57.4	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.05	0.59		0.10	0.64	
Clearance Time (s)	3.6	3.6		3.6	3.6		3.1	4.3		3.1	4.3	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	83	312		103	309		96	2065		175	2237	
v/s Ratio Prot		0.13			0.14		0.04	0.30		c0.08	c0.31	
v/s Ratio Perm	0.09			c0.14								
v/c Ratio	0.49	0.72		0.81	0.79		0.67	0.50		0.77	0.48	
Uniform Delay, d1	33.6	35.1		35.7	35.6		41.7	10.6		39.6	8.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	6.8		33.5	12.3		12.7	0.9		17.2	0.7	
Delay (s)	35.2	41.9		69.2	47.9		54.5	11.5		56.8	9.2	
Level of Service	D	D		E	D		D	B		E	A	
Approach Delay (s)		41.0			53.0			13.9			14.5	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM Average Control Delay			21.4	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			64.9%	ICU Level of Service				C				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: E 20th Street & Park Ave

Existing Conditions
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	 		 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1583	3539	1583	1770	3539
Volume (vph)	145	321	518	161	400	500
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	349	563	175	435	543
RTOR Reduction (vph)	0	282	0	113	0	0
Lane Group Flow (vph)	158	67	563	62	435	543
Turn Type	Perm		Perm		Prot	
Protected Phases	8		2		1	6
Permitted Phases	8		2			
Actuated Green, G (s)	9.6	9.6	14.3	14.3	17.4	34.3
Effective Green, g (s)	10.1	10.1	14.4	14.4	16.4	34.8
Actuated g/C Ratio	0.19	0.19	0.27	0.27	0.31	0.66
Clearance Time (s)	4.5	4.5	4.1	4.1	3.0	4.5
Vehicle Extension (s)	3.5	3.5	3.0	3.0	0.5	3.0
Lane Grp Cap (vph)	655	302	963	431	549	2328
v/s Ratio Prot	c0.05		c0.16		c0.25	0.15
v/s Ratio Perm		0.04		0.04		
v/c Ratio	0.24	0.22	0.58	0.14	0.79	0.23
Uniform Delay, d1	18.2	18.1	16.7	14.6	16.7	3.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.4	0.9	0.2	7.2	0.1
Delay (s)	18.4	18.5	17.6	14.7	23.9	3.7
Level of Service	B	B	B	B	C	A
Approach Delay (s)	18.5		16.9			12.7
Approach LOS	B		B			B
Intersection Summary						
HCM Average Control Delay			15.4	HCM Level of Service		B
HCM Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			52.9	Sum of lost time (s)		12.0
Intersection Capacity Utilization			52.3%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

























HCM Signalized Intersection Capacity Analysis
 4: E 20th Street & Dr Martin Luther King Jr Pkwy

Existing Conditions
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	3433	3494		1770	1863	1583	1770	1703	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	3433	3494		1770	1863	1583	1770	1703	
Volume (vph)	27	926	254	461	733	68	211	12	440	30	11	15
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	1007	276	501	797	74	229	13	478	33	12	16
RTOR Reduction (vph)	0	0	87	0	4	0	0	0	367	0	15	0
Lane Group Flow (vph)	29	1007	189	501	867	0	229	13	111	33	13	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	2.1	28.5	28.5	15.1	41.6		13.6	15.6	15.6	2.2	4.2	
Effective Green, g (s)	1.1	28.6	28.6	14.1	41.6		12.6	14.6	14.6	1.2	3.2	
Actuated g/C Ratio	0.01	0.38	0.38	0.19	0.56		0.17	0.20	0.20	0.02	0.04	
Clearance Time (s)	3.0	4.1	4.1	3.0	4.0		3.0	3.0	3.0	3.0	3.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	26	1359	608	650	1951		299	365	310	29	73	
v/s Ratio Prot	0.02	c0.28		c0.15	0.25		c0.13	0.01		0.02	0.01	
v/s Ratio Perm			0.12						c0.07			
v/c Ratio	1.12	0.74	0.31	0.77	0.44		0.77	0.04	0.36	1.14	0.17	
Uniform Delay, d1	36.7	19.8	16.1	28.7	9.7		29.5	24.2	25.9	36.6	34.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	214.2	1.9	0.1	5.1	0.1		10.1	0.0	0.3	212.0	0.4	
Delay (s)	250.9	21.7	16.2	33.8	9.7		39.6	24.3	26.1	248.6	34.8	
Level of Service	F	C	B	C	A		D	C	C	F	C	
Approach Delay (s)		25.6			18.5			30.4			150.5	
Approach LOS		C			B			C			F	
Intersection Summary												
HCM Average Control Delay			26.0			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			74.5			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			67.1%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Eaton Road & Cohasset Road

Existing Conditions
PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583	
Volume (vph)	78	94	80	4	88	51	102	272	7	63	483	180	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	85	102	87	4	96	55	111	296	8	68	525	196	
RTOR Reduction (vph)	0	0	66	0	0	46	0	0	5	0	0	90	
Lane Group Flow (vph)	85	102	21	4	96	9	111	296	3	68	525	106	
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)	3.9	9.1	9.1	0.5	5.7	5.7	3.6	13.8	13.8	2.8	13.0	13.0	
Effective Green, g (s)	2.9	10.1	10.1	0.0	6.7	6.7	2.6	14.8	14.8	1.8	14.0	14.0	
Actuated g/C Ratio	0.07	0.24	0.24	0.00	0.16	0.16	0.06	0.35	0.35	0.04	0.33	0.33	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	
Vehicle Extension (s)	2.5	2.5	2.5	0.5	2.5	2.5	0.5	3.0	3.0	0.5	3.0	3.0	
Lane Grp Cap (vph)	122	847	379	0	562	251	109	1241	555	75	1174	525	
v/s Ratio Prot	c0.05	c0.03			c0.03		c0.06	0.08		0.04	c0.15		
v/s Ratio Perm			0.01			0.01			0.00			0.07	
v/c Ratio	0.70	0.12	0.05	no cap	0.17	0.03	1.02	0.24	0.01	0.91	0.45	0.20	
Uniform Delay, d1	19.2	12.6	12.4	Error	15.3	15.0	19.8	9.7	8.9	20.1	11.1	10.1	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.7	0.0	0.0	Error	0.1	0.0	91.2	0.1	0.0	71.0	0.3	0.2	
Delay (s)	34.0	12.6	12.4	Error	15.5	15.1	111.0	9.8	8.9	91.2	11.3	10.3	
Level of Service	C	B	B	F	B	B	F	A	A	F	B	B	
Approach Delay (s)		19.2			Error			36.9			18.0		
Approach LOS		B			F			D			B		
Intersection Summary													
HCM Average Control Delay			Error									HCM Level of Service	F
HCM Volume to Capacity ratio			0.49										
Actuated Cycle Length (s)			42.2									Sum of lost time (s)	20.0
Intersection Capacity Utilization			40.0%									ICU Level of Service	A
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 6: Eaton Road & Hicks Lane



















Existing Conditions
 PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Sign Control		Stop	Stop		Stop	
Volume (vph)	87	309	443	80	63	58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	95	336	482	87	68	63
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	430	568	132			
Volume Left (vph)	95	0	68			
Volume Right (vph)	0	87	63			
Hadj (s)	0.08	-0.06	-0.15			
Departure Headway (s)	5.1	4.8	6.1			
Degree Utilization, x	0.61	0.76	0.22			
Capacity (veh/h)	680	732	538			
Control Delay (s)	15.8	21.7	10.8			
Approach Delay (s)	15.8	21.7	10.8			
Approach LOS	C	C	B			
Intersection Summary						
Delay			18.2			
HCM Level of Service			C			
Intersection Capacity Utilization			66.3%	ICU Level of Service	C	
Analysis Period (min)			15			

























HCM Signalized Intersection Capacity Analysis
7: Cohasset Road & Esplanade

Existing Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor				0.97		1.00		0.95		1.00	0.95	
Frt				1.00		0.85		0.96		1.00	1.00	
Flt Protected				0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)				3433		1583		3399		1770	3539	
Flt Permitted				0.95		1.00		1.00		0.95	1.00	
Satd. Flow (perm)				3433		1583		3399		1770	3539	
Volume (vph)	0	0	0	436	0	253	0	851	305	187	585	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	474	0	275	0	925	332	203	636	0
RTOR Reduction (vph)	0	0	0	0	0	232	0	25	0	0	0	0
Lane Group Flow (vph)	0	0	0	474	0	43	0	1232	0	203	636	0
Turn Type				Prot		custom				Prot		
Protected Phases				3				2		1	6	
Permitted Phases						8						
Actuated Green, G (s)				10.2		9.2		32.4		11.1	46.5	
Effective Green, g (s)				10.2		10.2		33.4		10.1	47.5	
Actuated g/C Ratio				0.16		0.16		0.51		0.15	0.72	
Clearance Time (s)				4.0		5.0		5.0		3.0	5.0	
Vehicle Extension (s)				1.5		3.5		2.0		1.2	2.0	
Lane Grp Cap (vph)				533		246		1728		272	2559	
v/s Ratio Prot				c0.14				c0.36		c0.11	0.18	
v/s Ratio Perm						0.03						
v/c Ratio				0.89		0.17		0.71		0.75	0.25	
Uniform Delay, d1				27.2		24.1		12.5		26.6	3.1	
Progression Factor				1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2				16.1		0.4		1.2		9.4	0.0	
Delay (s)				43.3		24.5		13.6		35.9	3.1	
Level of Service				D		C		B		D	A	
Approach Delay (s)		0.0			36.4			13.6			11.0	
Approach LOS		A			D			B			B	
Intersection Summary												
HCM Average Control Delay			18.9									HCM Level of Service B
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			65.7								12.0	
Intersection Capacity Utilization			66.1%									ICU Level of Service C
Analysis Period (min)			15									
c Critical Lane Group												




















HCM Signalized Intersection Capacity Analysis
8: Vallombrosa Ave & Mangrove Ave

Existing Conditions
PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1681	1734	1583	1681	1752	1583	1770	3539	1583	1770	3539	1583	
Flt Permitted	0.95	0.74	1.00	0.95	0.86	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1681	1317	1583	1681	1517	1583	1770	3539	1583	1770	3539	1583	
Volume (vph)	596	259	95	282	195	114	141	533	208	128	499	364	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	648	282	103	307	212	124	153	579	226	139	542	396	
RTOR Reduction (vph)	0	0	62	0	0	74	0	0	175	0	0	251	
Lane Group Flow (vph)	452	478	41	252	267	50	153	579	51	139	542	145	
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)	17.1	62.5	45.4	17.1	62.5	45.4	13.7	24.8	24.8	12.1	23.2	23.2	
Effective Green, g (s)	16.1	61.0	44.9	16.1	61.0	44.9	12.7	24.3	24.3	11.1	22.7	22.7	
Actuated g/C Ratio	0.14	0.54	0.40	0.14	0.54	0.40	0.11	0.22	0.22	0.10	0.20	0.20	
Clearance Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	
Vehicle Extension (s)	0.5	1.0	1.0	0.5	1.0	1.0	2.0	3.0	3.0	1.0	3.0	3.0	
Lane Grp Cap (vph)	241	774	632	241	857	632	200	765	342	175	715	320	
v/s Ratio Prot	c0.27	0.09		0.15	0.04		c0.09	c0.16		0.08	0.15		
v/s Ratio Perm		c0.25	0.03		0.12	0.03			0.03			0.09	
v/c Ratio	1.88	0.62	0.07	1.05	0.31	0.08	0.77	0.76	0.15	0.79	0.76	0.45	
Uniform Delay, d1	48.2	17.7	20.8	48.2	14.1	20.9	48.4	41.3	35.7	49.5	42.3	39.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	409.4	1.0	0.0	70.4	0.1	0.0	14.4	4.3	0.2	20.2	4.6	1.0	
Delay (s)	457.5	18.7	20.8	118.6	14.2	20.9	62.8	45.6	35.9	69.7	46.9	40.4	
Level of Service	F	B	C	F	B	C	E	D	D	E	D	D	
Approach Delay (s)		210.9			56.4			46.0			47.5		
Approach LOS		F			E			D			D		
Intersection Summary													
HCM Average Control Delay			94.2			HCM Level of Service							F
HCM Volume to Capacity ratio			0.86										
Actuated Cycle Length (s)			112.4			Sum of lost time (s)							12.0
Intersection Capacity Utilization			71.4%			ICU Level of Service							C
Analysis Period (min)			15										
c Critical Lane Group													





















HCM Signalized Intersection Capacity Analysis
9: Hegan Lane & Midway

Existing Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	4.0			4.0	4.0
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.96					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1758					1770	1863			1863	1583
Flt Permitted		0.75					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1374					1770	1863			1863	1583
Volume (vph)	202	0	24	0	0	0	16	374	0	0	319	362
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	26	0	0	0	17	407	0	0	347	393
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	195
Lane Group Flow (vph)	0	236	0	0	0	0	17	407	0	0	347	198
Turn Type	Perm			Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)		10.3					0.7	26.8			22.1	22.1
Effective Green, g (s)		10.3					0.7	26.8			22.1	22.1
Actuated g/C Ratio		0.23					0.02	0.59			0.49	0.49
Clearance Time (s)		4.0					4.0	4.0			4.0	4.0
Vehicle Extension (s)		3.0					3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		314					27	1107			913	776
v/s Ratio Prot							0.01	c0.22			0.19	
v/s Ratio Perm		c0.17										0.13
v/c Ratio		0.75					0.63	0.37			0.38	0.26
Uniform Delay, d1		16.2					22.1	4.8			7.2	6.7
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		9.7					38.0	0.9			1.2	0.8
Delay (s)		25.9					60.1	5.7			8.4	7.5
Level of Service		C					E	A			A	A
Approach Delay (s)		25.9			0.0			7.9			7.9	
Approach LOS		C			A			A			A	
Intersection Summary												
HCM Average Control Delay			11.1				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			45.1				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			39.0%				ICU Level of Service				A	
Analysis Period (min)			15									
c Critical Lane Group												



























HCM Signalized Intersection Capacity Analysis
 10: E Park Ave & Park Ave

Existing Conditions
 PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)				4.0	4.0	4.0		4.0	4.0	4.0	4.0		
Lane Util. Factor				0.95	0.95	1.00		1.00	1.00	0.95	0.95		
Frt				1.00	1.00	0.85		1.00	0.85	1.00	1.00		
Flt Protected				0.95	0.95	1.00		1.00	1.00	0.95	0.99		
Satd. Flow (prot)				1681	1681	1583		1863	1583	1681	1760		
Flt Permitted				0.95	0.69	1.00		1.00	1.00	0.95	0.97		
Satd. Flow (perm)				1681	1220	1583		1863	1583	1681	1716		
Volume (vph)	0	0	0	468	0	328	0	267	537	259	220	0	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	0	0	509	0	357	0	290	584	282	239	0	
RTOR Reduction (vph)	0	0	0	0	0	197	0	0	437	0	0	0	
Lane Group Flow (vph)	0	0	0	255	254	160	0	290	147	254	267	0	
Turn Type	Prot			Prot		Perm	Prot		Perm		Prot		
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases						8			2				
Actuated Green, G (s)				40.7	45.5	45.5		25.1	25.1	18.3	48.9		
Effective Green, g (s)				40.7	46.5	46.5		26.1	26.1	19.3	49.4		
Actuated g/C Ratio				0.39	0.45	0.45		0.25	0.25	0.19	0.48		
Clearance Time (s)				4.0	5.0	5.0		5.0	5.0	5.0	4.5		
Vehicle Extension (s)				1.0	3.5	3.5		2.5	2.5	1.0	3.5		
Lane Grp Cap (vph)				658	727	708		468	398	312	824		
v/s Ratio Prot				c0.15	0.14			c0.16		c0.15	0.06		
v/s Ratio Perm					c0.02	0.10			0.09		0.09		
v/c Ratio				0.39	0.35	0.23		0.62	0.37	0.81	0.32		
Uniform Delay, d1				22.7	18.8	17.6		34.5	32.1	40.6	16.9		
Progression Factor				1.00	1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2				0.1	0.3	0.2		2.1	0.4	14.2	0.3		
Delay (s)				22.8	19.1	17.8		36.6	32.5	54.8	17.2		
Level of Service				C	B	B		D	C	D	B		
Approach Delay (s)		0.0			19.7			33.9			35.5		
Approach LOS		A			B			C			D		
Intersection Summary													
HCM Average Control Delay			28.8	HCM Level of Service						C			
HCM Volume to Capacity ratio			0.53										
Actuated Cycle Length (s)			103.9	Sum of lost time (s)						12.0			
Intersection Capacity Utilization			52.9%	ICU Level of Service						A			
Analysis Period (min)			15										
c Critical Lane Group													
























HCM Signalized Intersection Capacity Analysis
 11: E 20th Street & Forest Ave

Existing Conditions
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3362		1770	3539	1583	1770	3539	1583	1770	3360	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3362		1770	3539	1583	1770	3539	1583	1770	3360	
Volume (vph)	274	392	197	118	388	82	467	394	41	174	282	144
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	298	426	214	128	422	89	508	428	45	189	307	157
RTOR Reduction (vph)	0	45	0	0	0	72	0	0	33	0	57	0
Lane Group Flow (vph)	298	595	0	128	422	17	508	428	12	189	407	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	20.3	27.1		9.1	15.9	15.9	20.3	21.7	21.7	13.6	15.0	
Effective Green, g (s)	19.3	27.6		8.1	16.4	16.4	19.3	22.2	22.2	12.6	15.5	
Actuated g/C Ratio	0.22	0.32		0.09	0.19	0.19	0.22	0.26	0.26	0.15	0.18	
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	395	1073		166	671	300	395	908	406	258	602	
v/s Ratio Prot	c0.17	c0.18		0.07	0.12		c0.29	0.12		0.11	c0.12	
v/s Ratio Perm						0.01			0.01			
v/c Ratio	0.75	0.55		0.77	0.63	0.06	1.29	0.47	0.03	0.73	0.68	
Uniform Delay, d1	31.4	24.4		38.3	32.3	28.7	33.6	27.2	24.1	35.3	33.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.1	0.4		18.0	1.3	0.0	146.7	0.1	0.0	8.9	2.4	
Delay (s)	38.5	24.7		56.3	33.6	28.7	180.3	27.3	24.1	44.2	35.5	
Level of Service	D	C		E	C	C	F	C	C	D	D	
Approach Delay (s)		29.1			37.5			106.4			38.1	
Approach LOS		C			D			F			D	
Intersection Summary												
HCM Average Control Delay			56.2				HCM Level of Service			E		
HCM Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			86.5				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			77.5%				ICU Level of Service			D		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis
 12: Nord Ave (CA-32) & W 2nd St

Existing Conditions
 PM Peak Hour

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	1.00
Satd. Flow (prot)	1770	3536		1770	3457			1745			1806	1583
Flt Permitted	0.35	1.00		0.43	1.00			0.87			0.75	1.00
Satd. Flow (perm)	648	3536		805	3457			1543			1401	1583
Volume (vph)	126	534	3	53	586	108	46	63	65	104	62	170
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	580	3	58	637	117	50	68	71	113	67	185
RTOR Reduction (vph)	0	0	0	0	28	0	0	53	0	0	0	100
Lane Group Flow (vph)	137	583	0	58	726	0	0	136	0	0	180	85
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	21.7	21.7		21.7	21.7			9.8			9.8	9.8
Effective Green, g (s)	21.7	21.7		21.7	21.7			9.8			9.8	9.8
Actuated g/C Ratio	0.55	0.55		0.55	0.55			0.25			0.25	0.25
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	356	1943		442	1899			383			348	393
v/s Ratio Prot		0.16			0.21							
v/s Ratio Perm	c0.21			0.07				0.09			c0.13	0.05
v/c Ratio	0.38	0.30		0.13	0.38			0.35			0.52	0.22
Uniform Delay, d1	5.1	4.8		4.3	5.1			12.2			12.8	11.8
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	3.1	0.4		0.6	0.6			0.6			1.3	0.3
Delay (s)	8.2	5.2		4.9	5.7			12.8			14.1	12.1
Level of Service	A	A		A	A			B			B	B
Approach Delay (s)		5.8			5.6			12.8			13.1	
Approach LOS		A			A			B			B	
Intersection Summary												
HCM Average Control Delay			7.6			HCM Level of Service				A		
HCM Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			39.5			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			55.7%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												





























HCM Signalized Intersection Capacity Analysis
 13: E Lassen Ave & Esplanade

Existing Conditions
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.93		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1799		1770	1737		1770	3390		1770	3506	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1799		1770	1737		1770	3390		1770	3506	
Volume (vph)	36	152	45	177	147	120	38	455	178	99	392	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	165	49	192	160	130	41	495	193	108	426	28
RTOR Reduction (vph)	0	10	0	0	23	0	0	37	0	0	4	0
Lane Group Flow (vph)	39	204	0	192	267	0	41	651	0	108	450	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	2.0	11.0		8.9	17.9		3.0	15.0		6.0	18.0	
Effective Green, g (s)	1.5	11.6		8.4	18.5		2.5	15.6		5.5	18.6	
Actuated g/C Ratio	0.03	0.20		0.15	0.32		0.04	0.27		0.10	0.33	
Clearance Time (s)	3.5	4.6		3.5	4.6		3.5	4.6		3.5	4.6	
Vehicle Extension (s)	1.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	46	365		260	563		77	926		170	1142	
v/s Ratio Prot	0.02	0.11		c0.11	c0.15		0.02	c0.19		c0.06	c0.13	
v/s Ratio Perm												
v/c Ratio	0.85	0.56		0.74	0.47		0.53	0.70		0.64	0.39	
Uniform Delay, d1	27.7	20.5		23.3	15.4		26.7	18.7		24.8	14.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	74.4	1.2		9.1	0.2		3.5	2.4		5.6	0.2	
Delay (s)	102.1	21.6		32.4	15.6		30.2	21.1		30.4	15.1	
Level of Service	F	C		C	B		C	C		C	B	
Approach Delay (s)		34.0			22.3			21.6			18.1	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM Average Control Delay			22.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			57.1			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			57.6%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

























HCM Signalized Intersection Capacity Analysis
 14: E Park Ave & Notre Dame Blvd

Existing Conditions
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  		 				 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.91		0.97	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	5041		3433	1786		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	5041		3433	1786		1770	1863	1583
Volume (vph)	492	1400	237	89	897	55	352	171	65	174	82	536
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	535	1522	258	97	975	60	383	186	71	189	89	583
RTOR Reduction (vph)	0	0	73	0	5	0	0	11	0	0	0	396
Lane Group Flow (vph)	535	1522	185	97	1030	0	383	246	0	189	89	187
Turn Type	Prot		Perm	Prot			Prot			Prot		custom
Protected Phases	5	2		1	6		3	8		7		4
Permitted Phases			2									6
Actuated Green, G (s)	18.3	40.9	40.9	7.5	30.0		16.9	18.4		14.2	15.2	30.0
Effective Green, g (s)	17.9	42.1	42.1	7.1	31.3		16.5	18.5		13.8	15.8	31.3
Actuated g/C Ratio	0.18	0.43	0.43	0.07	0.32		0.17	0.19		0.14	0.16	0.32
Clearance Time (s)	3.6	5.2	5.2	3.6	5.3		3.6	4.1		3.6	4.6	5.3
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	630	1528	684	129	1618		581	339		251	302	508
v/s Ratio Prot	c0.16	c0.43		0.05	0.20		0.11	c0.14		c0.11	0.05	
v/s Ratio Perm			0.12									0.12
v/c Ratio	0.85	1.00	0.27	0.75	0.64		0.66	0.72		0.75	0.29	0.37
Uniform Delay, d1	38.5	27.6	17.8	44.3	28.2		37.9	37.1		40.2	35.9	25.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.0	21.9	0.1	19.5	0.6		2.1	6.4		10.8	0.2	0.2
Delay (s)	48.5	49.5	17.9	63.8	28.9		39.9	43.5		51.0	36.1	25.7
Level of Service	D	D	B	E	C		D	D		D	D	C
Approach Delay (s)		45.8			31.8			41.4			32.3	
Approach LOS		D			C			D			C	
Intersection Summary												
HCM Average Control Delay			39.7			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			97.5			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			79.6%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												























HCM Signalized Intersection Capacity Analysis
 1: E 1st Ave & Mangrove Ave

Cumulative Conditions
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	90	420	80	200	440	140	90	500	100	120	490	140
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	457	87	217	478	152	98	543	109	130	533	152
RTOR Reduction (vph)	0	0	52	0	0	93	0	0	64	0	0	113
Lane Group Flow (vph)	98	457	35	217	478	59	98	543	45	130	533	39
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	21.4	21.4	11.5	27.4	27.4	5.7	16.9	16.9	6.5	17.7	17.7
Effective Green, g (s)	4.6	21.3	21.3	10.6	27.3	27.3	4.8	17.2	17.2	5.6	18.0	18.0
Actuated g/C Ratio	0.07	0.30	0.30	0.15	0.39	0.39	0.07	0.24	0.24	0.08	0.25	0.25
Clearance Time (s)	3.1	3.9	3.9	3.1	3.9	3.9	3.1	4.3	4.3	3.1	4.3	4.3
Vehicle Extension (s)	1.0	1.5	1.5	1.0	1.5	1.5	1.0	2.5	2.5	1.0	2.5	2.5
Lane Grp Cap (vph)	115	561	477	265	719	611	120	861	385	140	901	403
v/s Ratio Prot	0.06	c0.25		c0.12	0.26		0.06	c0.15		c0.07	0.15	
v/s Ratio Perm			0.02			0.04			0.03			0.02
v/c Ratio	0.85	0.81	0.07	0.82	0.66	0.10	0.82	0.63	0.12	0.93	0.59	0.10
Uniform Delay, d1	32.7	22.9	17.6	29.1	17.9	13.8	32.5	23.9	20.8	32.4	23.1	20.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.8	8.4	0.0	16.8	1.8	0.0	31.7	1.3	0.1	53.6	0.9	0.1
Delay (s)	73.5	31.3	17.7	45.9	19.7	13.9	64.3	25.2	20.9	86.0	24.0	20.2
Level of Service	E	C	B	D	B	B	E	C	C	F	C	C
Approach Delay (s)		35.9			25.4			29.7			33.2	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM Average Control Delay			30.7				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			70.7				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			67.0%				ICU Level of Service			C		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis
2: E 5th St & Mangrove Ave

Cumulative Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.97		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1807		1770	1801		1770	3424		1770	3472	
Flt Permitted	0.15	1.00		0.22	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	288	1807		403	1801		1770	3424		1770	3472	
Volume (vph)	100	360	90	230	390	110	70	580	160	100	480	70
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	391	98	250	424	120	76	630	174	109	522	76
RTOR Reduction (vph)	0	10	0	0	12	0	0	28	0	0	12	0
Lane Group Flow (vph)	109	479	0	250	532	0	76	776	0	109	586	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.7	30.7		30.7	30.7		6.3	37.3		7.0	38.0	
Effective Green, g (s)	30.3	30.3		30.3	30.3		5.4	37.6		6.1	38.3	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.06	0.44		0.07	0.45	
Clearance Time (s)	3.6	3.6		3.6	3.6		3.1	4.3		3.1	4.3	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	101	637		142	635		111	1497		126	1546	
v/s Ratio Prot		0.26			0.30		0.04	c0.23		c0.06	0.17	
v/s Ratio Perm	0.38			c0.62								
v/c Ratio	1.08	0.75		1.76	0.84		0.68	0.52		0.87	0.38	
Uniform Delay, d1	27.9	24.5		27.9	25.6		39.5	17.6		39.5	15.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	112.5	4.4		369.4	9.1		13.0	1.3		40.9	0.7	
Delay (s)	140.4	29.0		397.3	34.7		52.5	18.9		80.5	16.6	
Level of Service	F	C		F	C		D	B		F	B	
Approach Delay (s)		49.3			148.8			21.8			26.5	
Approach LOS		D			F			C			C	
Intersection Summary												
HCM Average Control Delay			62.3				HCM Level of Service				E	
HCM Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			86.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			77.2%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Park Ave & E 20th Street

Cumulative Conditions
AM Peak Hour





























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑↑	↑↑	↘	↙↘	↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	280	410	690	100	170	230
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	446	750	109	185	250
RTOR Reduction (vph)	0	0	0	71	0	206
Lane Group Flow (vph)	304	446	750	38	185	44
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	10.8	29.4	16.0	16.0	7.5	7.5
Effective Green, g (s)	9.8	29.9	16.1	16.1	8.0	8.0
Actuated g/C Ratio	0.21	0.65	0.35	0.35	0.17	0.17
Clearance Time (s)	3.0	4.5	4.1	4.1	4.5	4.5
Vehicle Extension (s)	0.5	3.0	3.0	3.0	3.5	3.5
Lane Grp Cap (vph)	378	2305	1241	555	598	276
v/s Ratio Prot	c0.17	0.13	c0.21		c0.05	
v/s Ratio Perm				0.02		0.03
v/c Ratio	0.80	0.19	0.60	0.07	0.31	0.16
Uniform Delay, d1	17.1	3.2	12.3	9.9	16.5	16.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.1	0.0	0.8	0.1	0.4	0.3
Delay (s)	28.3	3.2	13.1	10.0	16.9	16.4
Level of Service	C	A	B	A	B	B
Approach Delay (s)		13.4	12.7		16.6	
Approach LOS		B	B		B	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	45.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			





























HCM Signalized Intersection Capacity Analysis
4: E 20th Street & Dr Martin Luther King Jr Pkwy

Cumulative Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 						 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	3433	3505		1770	1863	1583	1770	1653	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	3433	3505		1770	1863	1583	1770	1653	
Volume (vph)	20	420	90	310	730	50	70	10	80	40	10	30
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	457	98	337	793	54	76	11	87	43	11	33
RTOR Reduction (vph)	0	0	72	0	7	0	0	0	78	0	31	0
Lane Group Flow (vph)	22	457	26	337	840	0	76	11	9	43	13	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	5.7	11.8	11.8	8.9	15.1		7.3	5.8	5.8	5.7	4.2	
Effective Green, g (s)	4.7	11.9	11.9	7.9	15.1		6.3	4.8	4.8	4.7	3.2	
Actuated g/C Ratio	0.10	0.26	0.26	0.17	0.33		0.14	0.11	0.11	0.10	0.07	
Clearance Time (s)	3.0	4.1	4.1	3.0	4.0		3.0	3.0	3.0	3.0	3.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	184	930	416	599	1168		246	197	168	184	117	
v/s Ratio Prot	0.01	0.13		c0.10	c0.24		c0.04	0.01		0.02	c0.01	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.12	0.49	0.06	0.56	0.72		0.31	0.06	0.05	0.23	0.11	
Uniform Delay, d1	18.4	14.1	12.5	17.1	13.2		17.5	18.2	18.2	18.6	19.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.1	0.0	0.7	1.8		0.3	0.0	0.0	0.2	0.2	
Delay (s)	18.5	14.3	12.5	17.8	15.0		17.8	18.3	18.3	18.9	19.9	
Level of Service	B	B	B	B	B		B	B	B	B	B	
Approach Delay (s)		14.2			15.8			18.1			19.4	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			15.7			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			45.3			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			46.5%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Eaton Road & Cohasset Road

Cumulative Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	220	230	180	10	170	240	110	600	10	90	330	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	250	196	11	185	261	120	652	11	98	359	120
RTOR Reduction (vph)	0	0	138	0	0	208	0	0	8	0	0	78
Lane Group Flow (vph)	239	250	58	11	185	53	120	652	3	98	359	42
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.8	18.9	18.9	5.7	12.8	12.8	6.6	19.1	19.1	7.7	20.2	20.2
Effective Green, g (s)	10.8	19.9	19.9	4.7	13.8	13.8	5.6	20.1	20.1	6.7	21.2	21.2
Actuated g/C Ratio	0.16	0.30	0.30	0.07	0.20	0.20	0.08	0.30	0.30	0.10	0.31	0.31
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.5	0.5	2.5	2.5	0.5	3.0	3.0	0.5	3.0	3.0
Lane Grp Cap (vph)	284	1045	467	123	725	324	147	1055	472	176	1113	498
v/s Ratio Prot	c0.14	c0.07		0.01	0.05		c0.07	c0.18		0.06	0.10	
v/s Ratio Perm			0.04			0.03			0.00			0.03
v/c Ratio	0.84	0.24	0.12	0.09	0.26	0.16	0.82	0.62	0.01	0.56	0.32	0.08
Uniform Delay, d1	27.5	18.0	17.4	29.3	22.5	22.1	30.4	20.3	16.6	28.9	17.6	16.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	19.4	0.1	0.1	0.1	0.1	0.2	27.0	1.1	0.0	2.2	0.2	0.1
Delay (s)	46.8	18.1	17.5	29.5	22.6	22.2	57.4	21.4	16.6	31.1	17.8	16.3
Level of Service	D	B	B	C	C	C	E	C	B	C	B	B
Approach Delay (s)		27.9			22.6			26.9			19.7	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM Average Control Delay			24.7				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			67.4				Sum of lost time (s)		12.0			
Intersection Capacity Utilization			53.6%				ICU Level of Service		A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
8: Vallombrosa Ave & Mangrove Ave


Cumulative Conditions
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1744	1583	1681	1770	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.88	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1566	1583	1681	1770	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	230	130	140	180	180	80	230	550	150	80	310	400
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	250	141	152	196	196	87	250	598	163	87	337	435
RTOR Reduction (vph)	0	0	104	0	0	60	0	0	114	0	0	352
Lane Group Flow (vph)	190	201	48	196	196	27	250	598	49	87	337	83
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	10.5	26.1	25.6	10.5	25.6	25.6	15.1	24.5	24.5	6.3	15.7	15.7
Effective Green, g (s)	9.5	25.1	25.1	9.5	25.1	25.1	14.1	24.0	24.0	5.3	15.2	15.2
Actuated g/C Ratio	0.12	0.31	0.31	0.12	0.31	0.31	0.18	0.30	0.30	0.07	0.19	0.19
Clearance Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5
Vehicle Extension (s)	0.5	1.0	1.0	0.5	1.0	1.0	2.0	3.0	3.0	1.0	3.0	3.0
Lane Grp Cap (vph)	200	513	497	200	556	497	312	1063	475	117	673	301
v/s Ratio Prot	c0.11	0.05		c0.12	0.04		c0.14	c0.17		0.05	0.10	
v/s Ratio Perm		c0.08	0.03		0.07	0.02			0.03			0.05
v/c Ratio	0.95	0.39	0.10	0.98	0.35	0.05	0.80	0.56	0.10	0.74	0.50	0.27
Uniform Delay, d1	35.0	21.4	19.4	35.1	21.1	19.1	31.6	23.5	20.2	36.6	29.0	27.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	48.4	0.2	0.0	56.9	0.1	0.0	13.0	0.7	0.1	19.8	0.6	0.5
Delay (s)	83.4	21.6	19.4	92.0	21.3	19.1	44.6	24.2	20.3	56.4	29.5	28.1
Level of Service	F	C	B	F	C	B	D	C	C	E	C	C
Approach Delay (s)		42.6			49.8			28.6			31.6	
Approach LOS		D			D			C			C	

Intersection Summary		
HCM Average Control Delay	35.6	HCM Level of Service D
HCM Volume to Capacity ratio	0.70	
Actuated Cycle Length (s)	79.9	Sum of lost time (s) 16.0
Intersection Capacity Utilization	57.2%	ICU Level of Service B
Analysis Period (min)	15	
c Critical Lane Group		













HCM Signalized Intersection Capacity Analysis
9: Hegan Lane & Midway

Cumulative Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	4.0			4.0	4.0
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.96					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1759					1770	1863			1863	1583
Flt Permitted		0.75					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1372					1770	1863			1863	1583
Volume (vph)	460	0	50	0	0	0	70	520	0	0	550	380
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	500	0	54	0	0	0	76	565	0	0	598	413
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	0	97
Lane Group Flow (vph)	0	549	0	0	0	0	76	565	0	0	598	316
Turn Type	Perm		Perm			Prot			Prot		Perm	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)		30.1					3.1	34.4			27.3	27.3
Effective Green, g (s)		30.1					3.1	34.4			27.3	27.3
Actuated g/C Ratio		0.42					0.04	0.47			0.38	0.38
Clearance Time (s)		4.0					4.0	4.0			4.0	4.0
Vehicle Extension (s)		3.0					3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		570					76	884			702	596
v/s Ratio Prot							c0.04	0.30			c0.32	
v/s Ratio Perm		c0.40										0.20
v/c Ratio		0.96					1.00	0.64			0.85	0.53
Uniform Delay, d1		20.7					34.7	14.4			20.7	17.6
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		28.4					103.2	3.5			12.4	3.4
Delay (s)		49.0					137.9	17.9			33.2	21.0
Level of Service		D					F	B			C	C
Approach Delay (s)		49.0			0.0			32.1			28.2	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM Average Control Delay			34.6				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			72.5				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			71.4%				ICU Level of Service			C		
Analysis Period (min)			15									
c	Critical Lane Group											
























HCM Signalized Intersection Capacity Analysis
 10: E Park Ave & Midway

Cumulative Conditions
 AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1583	1863	1583	1681	1770
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1583	1863	1583	1681	1770
Volume (vph)	480	320	540	410	480	500
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	348	587	446	522	543
RTOR Reduction (vph)	0	272	0	203	0	0
Lane Group Flow (vph)	522	76	587	243	522	543
Turn Type	custom		Perm		Prot	
Protected Phases	3		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	21.1	26.4	42.2	42.2	41.2	88.9
Effective Green, g (s)	21.1	27.4	43.2	43.2	42.2	89.4
Actuated g/C Ratio	0.17	0.22	0.35	0.35	0.34	0.72
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	4.5
Vehicle Extension (s)	1.0	3.5	2.5	2.5	1.0	3.5
Lane Grp Cap (vph)	580	348	645	548	568	1268
v/s Ratio Prot	c0.15		c0.32		c0.31	0.14
v/s Ratio Perm		c0.05		0.15		0.16
v/c Ratio	0.90	0.22	0.91	0.44	0.92	0.43
Uniform Delay, d1	50.8	39.9	38.9	31.5	39.7	7.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.7	0.4	17.0	0.4	19.6	0.3
Delay (s)	67.5	40.3	56.0	31.9	59.3	7.5
Level of Service	E	D	E	C	E	A
Approach Delay (s)	56.6		45.6			32.9
Approach LOS	E		D			C
Intersection Summary						
HCM Average Control Delay			44.3		HCM Level of Service	D
HCM Volume to Capacity ratio			0.87			
Actuated Cycle Length (s)			124.8		Sum of lost time (s)	12.0
Intersection Capacity Utilization			78.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
11: E 20th Street & Forest Ave

Cumulative Conditions
AM Peak Hour
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3338		1770	3539	1583	1770	3539	1583	1770	3183	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3338		1770	3539	1583	1770	3539	1583	1770	3183	
Volume (vph)	280	410	250	110	940	170	190	210	50	160	260	530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	446	272	120	1022	185	207	228	54	174	283	576
RTOR Reduction (vph)	0	57	0	0	0	71	0	0	41	0	244	0
Lane Group Flow (vph)	304	661	0	120	1022	114	207	228	13	174	615	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	20.6	47.6		10.4	37.4	37.4	16.8	28.0	28.0	14.9	26.1	
Effective Green, g (s)	19.6	48.1		9.4	37.9	37.9	15.8	28.5	28.5	13.9	26.6	
Actuated g/C Ratio	0.17	0.42		0.08	0.33	0.33	0.14	0.25	0.25	0.12	0.23	
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	299	1385		144	1157	518	241	870	389	212	731	
v/s Ratio Prot	c0.17	0.20		0.07	c0.29		c0.12	0.06		0.10	c0.19	
v/s Ratio Perm						0.07			0.01			
v/c Ratio	1.02	0.48		0.83	0.88	0.22	0.86	0.26	0.03	0.82	0.95dr	
Uniform Delay, d1	48.2	24.7		52.5	36.9	28.3	49.0	35.2	33.2	49.8	42.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	56.4	0.1		30.8	8.0	0.1	24.1	0.1	0.0	20.9	8.3	
Delay (s)	104.5	24.8		83.2	44.9	28.4	73.0	35.3	33.2	70.7	50.9	
Level of Service	F	C		F	D	C	E	D	C	E	D	
Approach Delay (s)		48.5			46.1			51.0			54.3	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	49.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	115.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			























HCM Signalized Intersection Capacity Analysis
 12: Nord Ave (CA-32) & W 2nd St

Cumulative Conditions
 AM Peak Hour

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.98			0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1770	3496		1770	3464			1761			1825	1583
Flt Permitted	0.38	1.00		0.27	1.00			0.89			0.81	1.00
Satd. Flow (perm)	705	3496		507	3464			1584			1508	1583
Volume (vph)	120	780	70	40	550	90	60	110	80	50	70	100
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	848	76	43	598	98	65	120	87	54	76	109
RTOR Reduction (vph)	0	13	0	0	25	0	0	48	0	0	0	82
Lane Group Flow (vph)	130	911	0	43	671	0	0	224	0	0	130	27
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	20.9	20.9		20.9	20.9			9.5			9.5	9.5
Effective Green, g (s)	20.9	20.9		20.9	20.9			9.5			9.5	9.5
Actuated g/C Ratio	0.54	0.54		0.54	0.54			0.25			0.25	0.25
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	384	1903		276	1885			392			373	392
v/s Ratio Prot		c0.26			0.19							
v/s Ratio Perm	0.18			0.08				c0.14			0.09	0.02
v/c Ratio	0.34	0.48		0.16	0.36			0.57			0.35	0.07
Uniform Delay, d1	4.9	5.4		4.4	4.9			12.7			11.9	11.1
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	2.4	0.9		1.2	0.5			2.0			0.6	0.1
Delay (s)	7.3	6.3		5.6	5.5			14.7			12.5	11.1
Level of Service	A	A		A	A			B			B	B
Approach Delay (s)		6.4			5.5			14.7			11.9	
Approach LOS		A			A			B			B	
Intersection Summary												
HCM Average Control Delay			7.6			HCM Level of Service				A		
HCM Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			38.4			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			57.8%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												


































HCM Signalized Intersection Capacity Analysis
 13: E Lassen Ave & Esplanade

Cumulative Conditions
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.92		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1831		1770	1712		1770	3425		1770	3520	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1831		1770	1712		1770	3425		1770	3520	
Volume (vph)	20	390	50	320	120	140	20	510	140	130	790	30
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	424	54	348	130	152	22	554	152	141	859	33
RTOR Reduction (vph)	0	3	0	0	26	0	0	23	0	0	2	0
Lane Group Flow (vph)	22	475	0	348	256	0	22	683	0	141	890	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	2.3	32.5		20.2	50.4		2.3	28.4		11.1	37.2	
Effective Green, g (s)	1.8	33.1		19.7	51.0		1.8	29.0		10.6	37.8	
Actuated g/C Ratio	0.02	0.31		0.18	0.47		0.02	0.27		0.10	0.35	
Clearance Time (s)	3.5	4.6		3.5	4.6		3.5	4.6		3.5	4.6	
Vehicle Extension (s)	1.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	29	559		322	805		29	916		173	1227	
v/s Ratio Prot	0.01	c0.26		c0.20	0.15		0.01	0.20		c0.08	c0.25	
v/s Ratio Perm												
v/c Ratio	0.76	0.85		1.08	0.32		0.76	0.75		0.82	0.73	
Uniform Delay, d1	53.1	35.3		44.4	17.9		53.1	36.3		47.9	30.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	65.7	11.1		73.4	0.1		65.7	3.3		23.5	2.2	
Delay (s)	118.7	46.4		117.7	18.0		118.7	39.7		71.5	32.9	
Level of Service	F	D		F	B		F	D		E	C	
Approach Delay (s)		49.6			73.1			42.1			38.2	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM Average Control Delay			48.7			HCM Level of Service					D	
HCM Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			108.4			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			81.6%			ICU Level of Service					D	
Analysis Period (min)			15									
c Critical Lane Group												

























HCM Signalized Intersection Capacity Analysis
 14: E Park Ave & Notre Dame Blvd

Cumulative Conditions
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 	 	 	  		 	 		 	 	 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.91		0.97	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	5034		3433	1801		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	5034		3433	1801		1770	1863	1583
Volume (vph)	400	760	330	90	1400	100	260	140	40	120	100	370
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	435	826	359	98	1522	109	283	152	43	130	109	402
RTOR Reduction (vph)	0	0	163	0	5	0	0	8	0	0	0	235
Lane Group Flow (vph)	435	826	196	98	1626	0	283	187	0	130	109	167
Turn Type	Prot		Perm	Prot			Prot			Prot		custom
Protected Phases	5	2		1	6		3	8		7		4
Permitted Phases			2									6
Actuated Green, G (s)	15.8	46.1	46.1	7.5	37.7		11.4	14.1		9.5	11.7	37.7
Effective Green, g (s)	15.4	47.3	47.3	7.1	39.0		11.0	14.2		9.1	12.3	39.0
Actuated g/C Ratio	0.16	0.50	0.50	0.08	0.42		0.12	0.15		0.10	0.13	0.42
Clearance Time (s)	3.6	5.2	5.2	3.6	5.3		3.6	4.1		3.6	4.6	5.3
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	564	1786	799	134	2095		403	273		172	245	659
v/s Ratio Prot	c0.13	0.23		0.06	c0.32		c0.08	c0.10		0.07	0.06	
v/s Ratio Perm			0.12									0.11
v/c Ratio	0.77	0.46	0.25	0.73	0.78		0.70	0.68		0.76	0.44	0.25
Uniform Delay, d1	37.5	15.0	13.1	42.4	23.6		39.8	37.6		41.2	37.6	17.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.9	0.1	0.1	16.1	1.7		4.5	5.5		15.3	0.5	0.1
Delay (s)	43.4	15.1	13.2	58.5	25.3		44.3	43.2		56.6	38.0	17.9
Level of Service	D	B	B	E	C		D	D		E	D	B
Approach Delay (s)		22.2			27.2			43.8			29.2	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM Average Control Delay			27.4			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			93.7			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			70.5%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												























HCM Signalized Intersection Capacity Analysis
1: E 1st Ave & Mangrove Ave

Cumulative Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	160	420	110	190	570	120	180	820	160	220	760	100
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	457	120	207	620	130	196	891	174	239	826	109
RTOR Reduction (vph)	0	0	73	0	0	88	0	0	59	0	0	50
Lane Group Flow (vph)	174	457	47	207	620	42	196	891	115	239	826	59
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.9	27.0	27.0	12.0	29.1	29.1	11.6	23.7	23.7	12.9	25.0	25.0
Effective Green, g (s)	9.0	26.9	26.9	11.1	29.0	29.0	10.7	24.0	24.0	12.0	25.3	25.3
Actuated g/C Ratio	0.10	0.30	0.30	0.12	0.32	0.32	0.12	0.27	0.27	0.13	0.28	0.28
Clearance Time (s)	3.1	3.9	3.9	3.1	3.9	3.9	3.1	4.3	4.3	3.1	4.3	4.3
Vehicle Extension (s)	1.0	1.5	1.5	1.0	1.5	1.5	1.5	2.5	2.5	1.0	2.5	2.5
Lane Grp Cap (vph)	177	557	473	218	600	510	210	944	422	236	995	445
v/s Ratio Prot	0.10	0.25		c0.12	c0.33		0.11	c0.25		c0.14	0.23	
v/s Ratio Perm			0.03			0.03			0.07			0.04
v/c Ratio	0.98	0.82	0.10	0.95	1.03	0.08	0.93	0.94	0.27	1.01	0.83	0.13
Uniform Delay, d1	40.4	29.3	22.8	39.2	30.5	21.2	39.3	32.3	26.1	39.0	30.3	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	62.2	9.0	0.0	45.9	45.6	0.0	43.1	17.2	0.3	61.9	5.9	0.1
Delay (s)	102.6	38.3	22.8	85.1	76.1	21.3	82.4	49.6	26.3	100.9	36.2	24.3
Level of Service	F	D	C	F	E	C	F	D	C	F	D	C
Approach Delay (s)		50.7			70.6			51.5			48.3	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM Average Control Delay			54.8	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			87.1%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: E 5th St & Mangrove Ave

Cumulative Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1786		1770	1784		1770	3463		1770	3507	
Flt Permitted	0.20	1.00		0.25	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	380	1786		469	1784		1770	3463		1770	3507	
Volume (vph)	70	210	80	100	230	90	90	950	160	130	940	60
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	228	87	109	250	98	98	1033	174	141	1022	65
RTOR Reduction (vph)	0	16	0	0	16	0	0	13	0	0	4	0
Lane Group Flow (vph)	76	299	0	109	332	0	98	1194	0	141	1083	0
Turn Type	Perm		Perm		Prot		Prot					
Protected Phases	4		8		5		2		1		6	
Permitted Phases	4		8									
Actuated Green, G (s)	20.0	20.0		20.0	20.0		7.3	49.0		10.0	51.7	
Effective Green, g (s)	19.6	19.6		19.6	19.6		6.4	49.3		9.1	52.0	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.07	0.55		0.10	0.58	
Clearance Time (s)	3.6	3.6		3.6	3.6		3.1	4.3		3.1	4.3	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	83	389		102	389		126	1897		179	2026	
v/s Ratio Prot		0.17			0.19		0.06	c0.34		c0.08	c0.31	
v/s Ratio Perm	0.20			c0.23								
v/c Ratio	0.92	0.77		1.07	0.85		0.78	0.63		0.79	0.53	
Uniform Delay, d1	34.4	33.1		35.2	33.8		41.1	14.0		39.5	11.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	69.6	8.0		108.8	15.8		23.5	1.6		18.7	1.0	
Delay (s)	104.0	41.1		144.0	49.6		64.6	15.6		58.2	12.6	
Level of Service	F	D		F	D		E	B		E	B	
Approach Delay (s)		53.3			72.1			19.3			17.9	
Approach LOS		D			E			B			B	
Intersection Summary												
HCM Average Control Delay			29.9	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				16.0				
Intersection Capacity Utilization			73.6%	ICU Level of Service				D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Park Ave & E 20th Street

Cumulative Conditions
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↗	↗	↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	470	510	870	170	150	330
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	511	554	946	185	163	359
RTOR Reduction (vph)	0	0	0	80	0	300
Lane Group Flow (vph)	511	554	946	105	163	59
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	21.6	46.0	21.8	21.8	10.3	10.3
Effective Green, g (s)	20.6	46.5	21.9	21.9	10.8	10.8
Actuated g/C Ratio	0.32	0.71	0.34	0.34	0.17	0.17
Clearance Time (s)	3.0	4.5	4.1	4.1	4.5	4.5
Vehicle Extension (s)	0.5	3.0	3.0	3.0	3.5	3.5
Lane Grp Cap (vph)	558	2520	1187	531	568	262
v/s Ratio Prot	c0.29	0.16	c0.27		c0.05	
v/s Ratio Perm				0.07		0.04
v/c Ratio	0.92	0.22	0.80	0.20	0.29	0.23
Uniform Delay, d1	21.5	3.2	19.7	15.4	23.9	23.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	19.4	0.0	3.8	0.2	0.3	0.5
Delay (s)	40.9	3.3	23.5	15.6	24.2	24.2
Level of Service	D	A	C	B	C	C
Approach Delay (s)		21.3	22.2		24.2	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	22.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	65.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			





























HCM Signalized Intersection Capacity Analysis
4: E 20th Street & Dr Martin Luther King Jr Pkwy

Cumulative Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	3433	3497		1770	1863	1583	1770	1723	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	3433	3497		1770	1863	1583	1770	1723	
Volume (vph)	30	1070	260	610	820	70	220	20	520	30	20	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	1163	283	663	891	76	239	22	565	33	22	22
RTOR Reduction (vph)	0	0	77	0	4	0	0	0	293	0	20	0
Lane Group Flow (vph)	33	1163	206	663	963	0	239	22	272	33	24	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	3.6	38.7	38.7	23.8	59.0		17.4	23.5	23.5	2.7	8.8	
Effective Green, g (s)	2.6	38.8	38.8	22.8	59.0		16.4	22.5	22.5	1.7	7.8	
Actuated g/C Ratio	0.03	0.38	0.38	0.22	0.58		0.16	0.22	0.22	0.02	0.08	
Clearance Time (s)	3.0	4.1	4.1	3.0	4.0		3.0	3.0	3.0	3.0	3.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	45	1349	603	769	2027		285	412	350	30	132	
v/s Ratio Prot	0.02	c0.33		c0.19	0.28		c0.14	0.01		0.02	0.01	
v/s Ratio Perm			0.13						c0.17			
v/c Ratio	0.73	0.86	0.34	0.86	0.47		0.84	0.05	0.78	1.10	0.18	
Uniform Delay, d1	49.3	29.0	22.4	38.0	12.4		41.4	31.3	37.3	50.0	44.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	41.0	5.7	0.1	9.5	0.1		18.2	0.0	9.5	196.3	0.2	
Delay (s)	90.3	34.7	22.5	47.5	12.5		59.6	31.3	46.8	246.3	44.2	
Level of Service	F	C	C	D	B		E	C	D	F	D	
Approach Delay (s)		33.6			26.7			50.1			130.9	
Approach LOS		C			C			D			F	
Intersection Summary												
HCM Average Control Delay			36.1			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			101.8			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			75.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												



























HCM Signalized Intersection Capacity Analysis
5: Eaton Road & Cohasset Road

Cumulative Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	130	270	170	10	250	110	170	380	10	270	670	330
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	293	185	11	272	120	185	413	11	293	728	359
RTOR Reduction (vph)	0	0	144	0	0	97	0	0	8	0	0	182
Lane Group Flow (vph)	141	293	41	11	272	23	185	413	3	293	728	177
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.3	13.5	13.5	5.2	11.4	11.4	9.6	16.5	16.5	14.6	21.5	21.5
Effective Green, g (s)	6.3	14.5	14.5	4.2	12.4	12.4	8.6	17.5	17.5	13.6	22.5	22.5
Actuated g/C Ratio	0.10	0.22	0.22	0.06	0.19	0.19	0.13	0.27	0.27	0.21	0.34	0.34
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5	2.5	0.5	2.5	2.5	0.5	3.0	3.0	0.5	3.0	3.0
Lane Grp Cap (vph)	169	780	349	113	667	298	231	941	421	366	1210	541
v/s Ratio Prot	c0.08	c0.08		0.01	0.08		0.10	0.12		c0.17	c0.21	
v/s Ratio Perm			0.03			0.01			0.00			0.11
v/c Ratio	0.83	0.38	0.12	0.10	0.41	0.08	0.80	0.44	0.01	0.80	0.60	0.33
Uniform Delay, d1	29.2	21.8	20.5	29.0	23.5	22.0	27.8	20.1	17.8	24.8	17.9	16.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.9	0.2	0.1	0.1	0.3	0.1	16.9	0.3	0.0	11.2	0.8	0.4
Delay (s)	57.1	22.0	20.6	29.2	23.8	22.1	44.6	20.4	17.8	36.0	18.8	16.4
Level of Service	E	C	C	C	C	C	D	C	B	D	B	B
Approach Delay (s)		29.6			23.4			27.7			21.8	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			24.8				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			65.8				Sum of lost time (s)		8.0			
Intersection Capacity Utilization			55.4%				ICU Level of Service		B			
Analysis Period (min)			15									
c	Critical Lane Group											















HCM Signalized Intersection Capacity Analysis
6: Eaton Road & Hicks Lane

Cumulative Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.97		1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3519		1770	3420		1770	1723		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3519		1770	3420		1770	1723		1770	1863	1583
Volume (vph)	520	760	30	10	790	230	10	10	10	180	10	400
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	565	826	33	11	859	250	11	11	11	196	11	435
RTOR Reduction (vph)	0	2	0	0	19	0	0	10	0	0	0	380
Lane Group Flow (vph)	565	857	0	11	1090	0	11	12	0	196	11	55
Turn Type	Prot			Prot			Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	41.0	84.4		0.8	44.2		6.5	6.5		15.6	15.6	15.6
Effective Green, g (s)	41.0	84.4		0.8	44.2		6.5	6.5		15.6	15.6	15.6
Actuated g/C Ratio	0.33	0.68		0.01	0.36		0.05	0.05		0.13	0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	589	2409		11	1226		93	91		224	236	200
v/s Ratio Prot	c0.32	0.24		0.01	c0.32		0.01	c0.01		c0.11	0.01	
v/s Ratio Perm												0.03
v/c Ratio	0.96	0.36		1.00	0.89		0.12	0.13		0.88	0.05	0.28
Uniform Delay, d1	40.3	8.1		61.2	37.2		55.7	55.7		52.9	47.3	48.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	26.9	0.1		271.4	8.2		0.6	0.6		29.3	0.1	0.7
Delay (s)	67.2	8.2		332.6	45.4		56.2	56.3		82.2	47.4	49.5
Level of Service	E	A		F	D		E	E		F	D	D
Approach Delay (s)		31.6			48.2			56.3			59.4	
Approach LOS		C			D			E			E	
Intersection Summary												
HCM Average Control Delay			43.2	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			123.3	Sum of lost time (s)				16.0				
Intersection Capacity Utilization			84.6%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												

























HCM Signalized Intersection Capacity Analysis
7: Cohasset Road & Esplanade

Cumulative Conditions
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	 		 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3433	1583	3371		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	3433	1583	3371		1770	3539
Volume (vph)	490	260	910	420	210	610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	533	283	989	457	228	663
RTOR Reduction (vph)	0	224	68	0	0	0
Lane Group Flow (vph)	533	59	1378	0	228	663
Turn Type	custom			Prot		
Protected Phases	3		2		1	6
Permitted Phases	8					
Actuated Green, G (s)	14.2	13.2	30.6		11.5	45.1
Effective Green, g (s)	14.2	14.2	31.6		10.5	46.1
Actuated g/C Ratio	0.21	0.21	0.46		0.15	0.67
Clearance Time (s)	4.0	5.0	5.0		3.0	5.0
Vehicle Extension (s)	1.5	3.5	2.0		1.2	2.0
Lane Grp Cap (vph)	714	329	1560		272	2389
v/s Ratio Prot	c0.16		c0.41		c0.13	0.19
v/s Ratio Perm	0.04					
v/c Ratio	0.75	0.18	0.88		0.84	0.28
Uniform Delay, d1	25.4	22.3	16.7		28.1	4.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.7	0.3	6.1		18.9	0.0
Delay (s)	29.1	22.6	22.8		47.0	4.5
Level of Service	C	C	C		D	A
Approach Delay (s)	26.8		22.8			15.3
Approach LOS	C		C			B
Intersection Summary						
HCM Average Control Delay			21.7	HCM Level of Service		C
HCM Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			68.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization			74.2%	ICU Level of Service	D	
Analysis Period (min)	15					
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
8: Vallombrosa Ave & Mangrove Ave




















Cumulative Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.98	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1732	1583	1681	1754	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	0.00	1.00	0.95	0.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	0	1583	1681	0	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	680	280	100	290	210	120	150	580	260	130	530	370
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	739	304	109	315	228	130	163	630	283	141	576	402
RTOR Reduction (vph)	0	0	79	0	0	96	0	0	228	0	0	320
Lane Group Flow (vph)	508	535	30	264	279	34	163	630	55	141	576	82
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	26.0	26.0	25.0	25.0	25.0	24.0	9.0	17.8	17.8	8.8	17.6	17.6
Effective Green, g (s)	25.0	25.0	24.5	24.0	24.0	23.5	8.0	17.3	17.3	7.8	17.1	17.1
Actuated g/C Ratio	0.28	0.28	0.27	0.27	0.27	0.26	0.09	0.19	0.19	0.09	0.19	0.19
Clearance Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5
Vehicle Extension (s)	0.5	1.0	1.0	0.5	1.0	1.0	2.0	3.0	3.0	1.0	3.0	3.0
Lane Grp Cap (vph)	469	483	433	450	470	415	158	683	306	154	675	302
v/s Ratio Prot	0.30	c0.31		0.16	c0.16		c0.09	c0.18		0.08	0.16	
v/s Ratio Perm			0.02			0.02			0.03			0.05
v/c Ratio	1.08	1.11	0.07	0.59	0.59	0.08	1.03	0.92	0.18	0.92	0.85	0.27
Uniform Delay, d1	32.3	32.3	24.1	28.5	28.6	24.9	40.8	35.5	30.2	40.6	35.0	30.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	65.8	73.7	0.0	1.3	1.3	0.0	80.2	18.0	0.3	47.3	10.2	0.5
Delay (s)	98.1	106.0	24.1	29.8	29.9	24.9	121.0	53.5	30.5	87.9	45.2	31.4
Level of Service	F	F	C	C	C	C	F	D	C	F	D	C
Approach Delay (s)		94.8			28.9			57.7			45.7	
Approach LOS		F			C			E			D	

Intersection Summary		
HCM Average Control Delay	60.1	HCM Level of Service E
HCM Volume to Capacity ratio	0.81	
Actuated Cycle Length (s)	89.6	Sum of lost time (s) 8.0
Intersection Capacity Utilization	76.3%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		













HCM Signalized Intersection Capacity Analysis
9: Hegan Lane & Midway

Cumulative Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	4.0			4.0	4.0
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frt		0.98					1.00	1.00			1.00	0.85
Flt Protected		0.96					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1749					1770	1863			1863	1583
Flt Permitted		0.76					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1385					1770	1863			1863	1583
Volume (vph)	260	0	50	0	0	0	90	490	0	0	320	370
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	0	54	0	0	0	98	533	0	0	348	402
RTOR Reduction (vph)	0	12	0	0	0	0	0	0	0	0	0	189
Lane Group Flow (vph)	0	325	0	0	0	0	98	533	0	0	348	213
Turn Type	Perm			Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)		16.6					4.7	33.1			24.4	24.4
Effective Green, g (s)		16.6					4.7	33.1			24.4	24.4
Actuated g/C Ratio		0.29					0.08	0.57			0.42	0.42
Clearance Time (s)		4.0					4.0	4.0			4.0	4.0
Vehicle Extension (s)		3.0					3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		398					144	1069			788	669
v/s Ratio Prot							c0.06	c0.29			0.19	
v/s Ratio Perm		c0.23										0.13
v/c Ratio		0.82					0.68	0.50			0.44	0.32
Uniform Delay, d1		19.1					25.8	7.3			11.8	11.1
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		12.2					12.4	1.7			1.8	1.2
Delay (s)		31.3					38.2	9.0			13.6	12.4
Level of Service		C					D	A			B	B
Approach Delay (s)		31.3			0.0			13.5			12.9	
Approach LOS		C			A			B			B	
Intersection Summary												
HCM Average Control Delay			16.8				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			57.7				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			56.6%				ICU Level of Service				B	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis
 10: E Park Ave & Midway

Cumulative Conditions
 PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1583	1863	1583	1681	1770
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1583	1863	1583	1681	1770
Volume (vph)	470	330	690	540	330	470
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	511	359	750	587	359	511
RTOR Reduction (vph)	0	282	0	191	0	0
Lane Group Flow (vph)	511	77	750	396	359	511
Turn Type	custom		Perm		Prot	
Protected Phases	3		2		1 6	
Permitted Phases	8		2			
Actuated Green, G (s)	22.1	27.4	59.7	59.7	31.0	96.2
Effective Green, g (s)	22.1	28.4	60.7	60.7	32.0	96.7
Actuated g/C Ratio	0.17	0.21	0.46	0.46	0.24	0.73
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	4.5
Vehicle Extension (s)	1.0	3.5	2.5	2.5	1.0	3.5
Lane Grp Cap (vph)	570	338	850	722	404	1286
v/s Ratio Prot	c0.15		c0.40		c0.21 0.10	
v/s Ratio Perm	c0.05		0.25		0.19	
v/c Ratio	0.90	0.23	0.88	0.55	0.89	0.40
Uniform Delay, d1	54.4	43.3	32.9	26.2	48.8	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.3	0.4	10.6	0.7	19.9	0.2
Delay (s)	70.6	43.7	43.6	26.9	68.8	7.2
Level of Service	E	D	D	C	E	A
Approach Delay (s)	59.5		36.3		32.6	
Approach LOS	E		D		C	
Intersection Summary						
HCM Average Control Delay			41.8	HCM Level of Service		D
HCM Volume to Capacity ratio			0.85			
Actuated Cycle Length (s)			133.1	Sum of lost time (s)		12.0
Intersection Capacity Utilization			84.5%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

























HCM Signalized Intersection Capacity Analysis
11: E 20th Street & Forest Ave

Cumulative Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3450		1770	3539	1583	1770	3539	1583	1770	3292	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3450		1770	3539	1583	1770	3539	1583	1770	3292	
Volume (vph)	570	990	200	160	390	90	600	660	130	250	320	280
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	620	1076	217	174	424	98	652	717	141	272	348	304
RTOR Reduction (vph)	0	12	0	0	0	68	0	0	64	0	127	0
Lane Group Flow (vph)	620	1281	0	174	424	30	652	717	77	272	525	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	20.2	40.3		15.4	35.5	35.5	20.2	28.6	28.6	20.2	28.6	
Effective Green, g (s)	19.2	40.8		14.4	36.0	36.0	19.2	29.1	29.1	19.2	29.1	
Actuated g/C Ratio	0.16	0.34		0.12	0.30	0.30	0.16	0.24	0.24	0.16	0.24	
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	284	1178		213	1066	477	284	862	385	284	802	
v/s Ratio Prot	c0.35	c0.37		0.10	0.12		c0.37	c0.20		0.15	0.16	
v/s Ratio Perm						0.02			0.05			
v/c Ratio	2.18	1.09		0.82	0.40	0.06	2.30	0.83	0.20	0.96	0.65	
Uniform Delay, d1	50.1	39.4		51.3	33.1	29.7	50.1	42.9	35.9	49.7	40.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	543.8	53.4		20.0	0.1	0.0	594.1	6.6	0.1	41.2	1.5	
Delay (s)	594.0	92.8		71.2	33.2	29.7	644.3	49.5	36.0	91.0	42.2	
Level of Service	F	F		E	C	C	F	D	D	F	D	
Approach Delay (s)		255.2			42.2			305.0			56.5	
Approach LOS		F			D			F			E	
Intersection Summary												
HCM Average Control Delay			204.3				HCM Level of Service				F	
HCM Volume to Capacity ratio			1.41									
Actuated Cycle Length (s)			119.5				Sum of lost time (s)				12.0	
Intersection Capacity Utilization			107.0%				ICU Level of Service				G	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 12: Nord Ave (CA-32) & W 2nd St

Cumulative Conditions
 PM Peak Hour

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		 			 			 			 	 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	1.00
Satd. Flow (prot)	1770	3533		1770	3479			1747			1813	1583
Flt Permitted	0.22	1.00		0.28	1.00			0.86			0.77	1.00
Satd. Flow (perm)	407	3533		520	3479			1524			1430	1583
Volume (vph)	170	820	10	60	860	110	50	70	70	110	90	180
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	891	11	65	935	120	54	76	76	120	98	196
RTOR Reduction (vph)	0	2	0	0	19	0	0	41	0	0	0	35
Lane Group Flow (vph)	185	900	0	65	1036	0	0	165	0	0	218	161
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	19.8	19.8		19.8	19.8			9.6			9.6	9.6
Effective Green, g (s)	19.8	19.8		19.8	19.8			9.6			9.6	9.6
Actuated g/C Ratio	0.53	0.53		0.53	0.53			0.26			0.26	0.26
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	215	1870		275	1842			391			367	406
v/s Ratio Prot		0.25			0.30							
v/s Ratio Perm	c0.45			0.13				0.11			c0.15	0.10
v/c Ratio	0.86	0.48		0.24	0.56			0.42			0.59	0.40
Uniform Delay, d1	7.6	5.6		4.7	5.9			11.6			12.2	11.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	33.6	0.9		2.0	1.2			0.7			2.6	0.6
Delay (s)	41.2	6.4		6.7	7.1			12.3			14.8	12.1
Level of Service	D	A		A	A			B			B	B
Approach Delay (s)		12.4			7.1			12.3			13.5	
Approach LOS		B			A			B			B	
Intersection Summary												
HCM Average Control Delay			10.5			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			37.4			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			67.6%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												





























HCM Signalized Intersection Capacity Analysis
 13: E Lassen Ave & Esplanade

Cumulative Conditions
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.92		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1798		1770	1715		1770	3454		1770	3508	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1798		1770	1715		1770	3454		1770	3508	
Volume (vph)	50	300	90	380	170	190	40	940	180	180	640	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	326	98	413	185	207	43	1022	196	196	696	43
RTOR Reduction (vph)	0	9	0	0	30	0	0	13	0	0	3	0
Lane Group Flow (vph)	54	415	0	413	362	0	43	1205	0	196	736	0
Turn Type	Prot		Prot		Prot		Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.1	29.4		20.0	43.3		5.5	40.8		14.5	49.8	
Effective Green, g (s)	5.6	30.0		19.5	43.9		5.0	41.4		14.0	50.4	
Actuated g/C Ratio	0.05	0.25		0.16	0.36		0.04	0.34		0.12	0.42	
Clearance Time (s)	3.5	4.6		3.5	4.6		3.5	4.6		3.5	4.6	
Vehicle Extension (s)	1.0	2.0		2.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	82	446		285	623		73	1183		205	1462	
v/s Ratio Prot	0.03	c0.23		c0.23	0.21		0.02	c0.35		c0.11	0.21	
v/s Ratio Perm												
v/c Ratio	0.66	0.93		1.45	0.58		0.59	1.02		0.96	0.50	
Uniform Delay, d1	56.7	44.4		50.7	31.1		56.9	39.8		53.1	26.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.6	25.8		220.8	0.9		7.6	30.9		49.6	0.3	
Delay (s)	70.3	70.3		271.5	32.0		64.5	70.6		102.7	26.3	
Level of Service	E	E		F	C		E	E		F	C	
Approach Delay (s)		70.3			154.8			70.4			42.3	
Approach LOS		E			F			E			D	
Intersection Summary												
HCM Average Control Delay			82.4			HCM Level of Service		F				
HCM Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			120.9	Sum of lost time (s)		16.0						
Intersection Capacity Utilization			97.3%	ICU Level of Service		F						
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 14: E Park Ave & Notre Dame Blvd

Cumulative Conditions
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  		 				 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.91		0.97	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	5027		3433	1805		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	5027		3433	1805		1770	1863	1583
Volume (vph)	1090	1520	240	90	1090	90	360	270	70	230	140	990
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1185	1652	261	98	1185	98	391	293	76	250	152	1076
RTOR Reduction (vph)	0	0	67	0	8	0	0	7	0	0	0	574
Lane Group Flow (vph)	1185	1652	194	98	1275	0	391	362	0	250	152	502
Turn Type	Prot		Perm		Prot		Prot		Prot		custom	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									6
Actuated Green, G (s)	25.1	50.5	50.5	9.8	35.1		14.9	21.0		19.8	25.4	35.1
Effective Green, g (s)	24.7	51.7	51.7	9.4	36.4		14.5	21.1		19.4	26.0	36.4
Actuated g/C Ratio	0.21	0.44	0.44	0.08	0.31		0.12	0.18		0.16	0.22	0.31
Clearance Time (s)	3.6	5.2	5.2	3.6	5.3		3.6	4.1		3.6	4.6	5.3
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	721	1556	696	141	1556		423	324		292	412	490
v/s Ratio Prot	c0.35	c0.47		0.06	0.25		0.11	c0.20		c0.14	0.08	
v/s Ratio Perm			0.12									0.32
v/c Ratio	1.64	1.06	0.28	0.70	0.82		0.92	1.12		0.86	0.37	1.02
Uniform Delay, d1	46.4	32.9	21.0	52.7	37.6		51.0	48.2		47.7	38.8	40.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	295.8	41.2	0.1	11.3	3.3		25.5	85.0		20.4	0.2	47.2
Delay (s)	342.3	74.1	21.1	64.0	40.9		76.5	133.3		68.1	39.0	87.8
Level of Service	F	E	C	E	D		E	F		E	D	F
Approach Delay (s)		172.2			42.5			104.1			79.4	
Approach LOS		F			D			F			E	
Intersection Summary												
HCM Average Control Delay			117.4		HCM Level of Service				F			
HCM Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			117.6		Sum of lost time (s)				12.0			
Intersection Capacity Utilization			104.6%		ICU Level of Service				G			
Analysis Period (min)			15									
c Critical Lane Group												

TECHNICAL MEMORANDUM

Date: April 16, 2010

To: Meredith Williams, City of Chico
Pat Angel, PMC

From: Chris Breiland and Kwasi Donkor, Fehr & Peers

Subject: City of Chico 4D Model Development and Results

RS09-2681

INTRODUCTION

Since the 1960s, transportation planners and engineers have used the output of traditional “four-step” travel demand forecasting (TDF) models to plan future roadway and transit networks. In general, these models have performed well in predicting the overall travel demand that resulted from buildout of the suburban neighborhoods that are characteristic of modern America. However, in the past decade, new trends in urban planning have emerged and there is a growing emphasis toward more compact development with a mix of housing types (e.g., single-family homes and apartments), work places, and retail opportunities. These “smart growth” communities have well documented benefits in terms of lower energy use, smaller development footprints which require less agricultural land or open space conversion, and healthier residents. In addition, there is ample evidence that smart growth communities generate fewer and shorter vehicle trips since residents and employees of these areas have more home, work, and shopping opportunities within walking or biking distance. Transit is also a more viable form of transportation since these developments have a larger number of potential transit users and can support more frequent transit service to regional destinations.

Key Idea:

Traditional travel demand forecasting (TDF) models have a blind spot when it comes to considering the travel benefits associated with smart growth developments. To address this shortcoming, Fehr & Peers has developed a TDF model enhancement that accounts for the vehicle trip reductions that have been documented for these types of developments.

The unique travel characteristics of smart growth communities pose a problem for traditional TDF models. While TDF models are sensitive to the location and type of different land uses, they operate on a vehicle-travel scale and measure proximity in terms of travel time by car or transit. Therefore, the close proximity of uses within a smart growth community that are typically accessible by walking and biking are not considered in a traditional TDF model. This lack of sensitivity to the built environment is a critical shortcoming of traditional TDF models that makes them unable to account for the vehicle trip reductions characteristic of smart growth communities.

To address this shortcoming, Fehr & Peers has developed an enhancement that corrects the smart growth blind spot in traditional TDF models. This document summarizes how the smart growth enhancement was developed for the City of Chico VISUM TDF model and presents the results of the TDF model run when the smart growth enhancement is enabled.

The remainder of this document is organized as follows:

Section 2 – Smart Growth and the “4Ds” Defined

Section 3 – Developing the 4D Values for the City of Chico

Section 4 – Implementing the 4D Enhancements in the City of Chico TDF Model

Section 5 – Results of the Enhanced 4D TDF Model Runs

SMART GROWTH AND THE 4Ds DEFINED

As described above, smart growth development principles seek to reduce the environmental impact of land use development by limiting the amount of land consumed, creating more energy efficient buildings, and increasing the viability of walking, biking, and transit. The focus of this document is on how smart growth developments increase the viability of non-auto modes of travel and thereby decrease the number of vehicle trips and the amount of vehicle miles traveled (VMT). Research conducted by Fehr & Peers, the Environmental Protection Agency, and academic researchers in 2001 found that four key smart growth variables have a strong influence on travel. These four variables have been termed the “4Ds”:

- Density – The number of dwelling units and employees per area (acres or square miles) of developed land
- Diversity – Jobs/housing balance
- Design – Pedestrian network quality
- Destinations – Accessibility by all modes to regional activity (jobs and retail) centers

Why the Ds Matter:

Research has shown that the 4D variables work together to reduce travel demand. As areas become more dense and diverse, have better pedestrian network design, and have more accessibility to regional destinations, fewer automobile trips are made, since residents and employees are more likely to walk between uses or even live and work on site.

The research indicates that the majority of travel in many smart growth communities is still by car; however, a substantial amount of travel in these developments occurs via other modes or shorter car trips.

Using household travel survey data from across the country and in communities of varying sizes, Fehr & Peers developed relationships between changes in travel behavior (e.g., the number of vehicle trips) and changes in the 4D variables. These changes were related in a ratio known as an elasticity. Simply put, an elasticity describes how a change in one variable (e.g., density) is correlated with the change in another variable (e.g., vehicle trips). Table 1 on the following page summarizes the vehicle trip elasticity related to the 4D variables from Fehr & Peers’ research.

The data in Table 1 is best explained with an example. The table shows that the vehicle trip elasticity related to density is -0.043. In other words, given a 100 percent increase in density (e.g., from five dwelling units per acre to ten dwelling units per acre), the corresponding decrease in vehicle trip making would be 4.3 percent ($+100\% \text{ density} \times -0.043 = -4.3\%$). Note that the elasticities work in both directions. For example, if a neighborhood has 50 percent less access to regional destinations than the average neighborhood, its vehicle trip generation would be expected to be 1.8 percent higher ($-50\% \text{ destinations} \times -0.036 = +1.8\%$).

TABLE 1 - FEHR & PEERS 4D NATIONAL VEHICLE TRIP ELASTICITY MEASUREMENTS	
D Variable	Vehicle Trip Elasticity
Density	-0.043
Diversity	-0.051
Design	-0.031
Destinations	-0.036

Source: *INDEX 4D Method*, Fehr & Peers and Criterion Planners, 2001.

To determine the overall impact on vehicle trips, the effect of each D variable is added together. For example, if a study neighborhood is 20 percent denser, 15 percent more diverse, has a 10 percent better pedestrian design index, but has access to 20 percent fewer regional destinations than an average neighborhood, the study neighborhood could be expected to generate 1.5 percent fewer vehicle trips ($20\% \times -0.043 + 15\% \times -0.051 + 10\% \times 0.031 + (-20\%) \times -0.036 = -1.5\%$).

The example above shows the importance of selecting a baseline scenario from which to measure changes in D variables and resulting variation in travel behavior. Typically the baseline scenario is a future business as usual condition, although the existing conditions can be used as well. In the case of the City of Chico enhancements, buildout of the 1994 General Plan will be used for the baseline scenario since it represents a reasonable business as usual future for the City. Changes in the 4Ds for the other land use alternatives will be measured against the 1994 General Plan.

How Do We Know the 4D Adjustments Are Valid for Chico?

The 4D relationships are based on a wide sample of travel data from communities across the country. In general, the national data revealed similar relationships between travel and density, diversity, design, and destinations regardless of where the data were collected. This wide ranging and robust dataset led the United States Environmental Protection Agency to endorse the 4D methods and include them as part of its “Smart Growth Index” model in the early 2000’s. Since this time, the elasticities and general relationships documented by Fehr & Peers have been confirmed by academics and practitioners in communities across the country.

DEVELOPING THE 4D VALUES FOR THE CITY OF CHICO

This section describes how the 4D input variables were calculated for the City of Chico’s future year land use scenarios. Per direction from the City, the following land use alternatives were considered:

- Buildout of 1994 General Plan (baseline scenario)
- General Plan Update Preferred Land Use Alternative
- General Plan Update Land Use Alternative A – Traditional Development Patterns
- General Plan Update Land Use Alternative C – Compact Development Patterns

Calculating the D variables for these land use alternatives started with collecting parcel-level GIS data from the City of Chico. The GIS data contained the following information:

- Existing and future land use (defined by the City's land use categories – see appendix)
- Existing and future vacancy status (e.g., was the parcel vacant or occupied by a use)
- Existing and future number of dwelling units or square feet of building space
- Existing and future number of employees (for non-residential uses)
- Acreage of parcel

The detailed parcel-level land use data supplied by the City allowed Fehr & Peers to calculate the following D variables in the GIS software:

- Density – residential population plus employment per square mile
- Diversity – a measure of jobs-housing balance

Density and Diversity Defined

Below are the specific definitions for density and diversity:

$$\text{Density} = \frac{(e + p)}{z}$$

e = employees within 0.5 miles of parcel

p = residential population within 0.5 miles of parcel

z = area of developed land within 0.5 miles of parcel

$$\text{Diversity} = 1 - \left| \frac{(b \times p) - e}{(b \times p) + e} \right|$$

b = regional employment / regional population

e = employees within 0.5 miles of parcel

p = residential population within 0.5 miles of parcel

As shown in the text box to the right, the density and diversity variables are based on the land uses within a half-mile radius of the parcel. This half-mile “buffer” distance came from the 4D research, which found that land uses within a half-mile of a person’s home had the greatest influence as whether they would drive or use some other form of transportation to reach their destination.

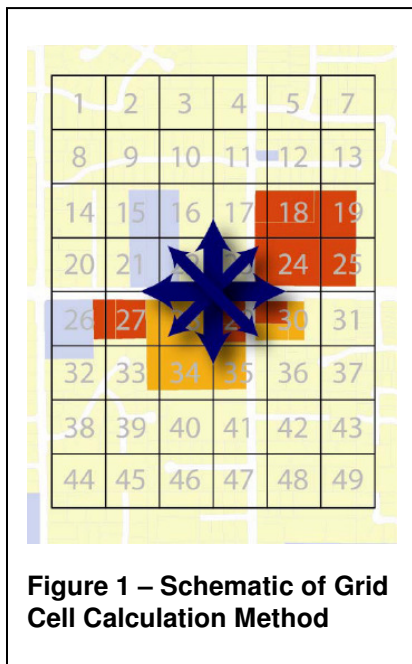


Figure 1 – Schematic of Grid Cell Calculation Method

To calculate the density and diversity variables for the City’s 28,000 parcels, Fehr & Peers used an approximation method based on grid cells. In this approach, the entire City is divided into grids that are one-third of a mile across. The first step in the process is to calculate the average density and diversity for each grid cell. Then the density and diversity values are calculated over a half-mile radius by averaging the values of nine grid cells. This “moving average” calculation is repeated for every grid cell in the city. Figure 1 shows a schematic of the grid cell calculation process. Figure Figures 2A through 2D show the average density per grid cell and figures 3A through 3D show the average diversity per grid cell with the for each of the four future year land use alternatives.

While the grid cells are required to calculate the density and diversity variables, the overall travel results are analyzed by the City of Chico TDF model using a larger geographic unit, the traffic analysis zone (TAZ). Figure 4 shows a map of the City’s TAZs. Based on the results of the grid cell analysis, the average density and diversity values were aggregated into TAZs using GIS software so that the results can be incorporated into the TDF model.

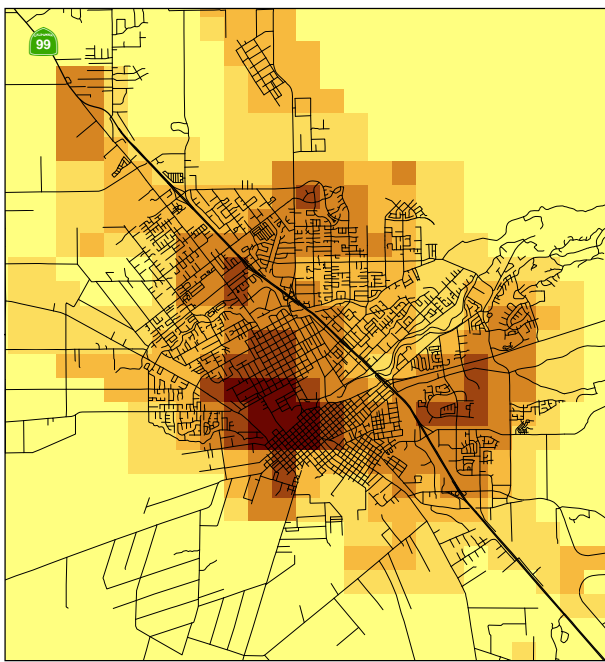
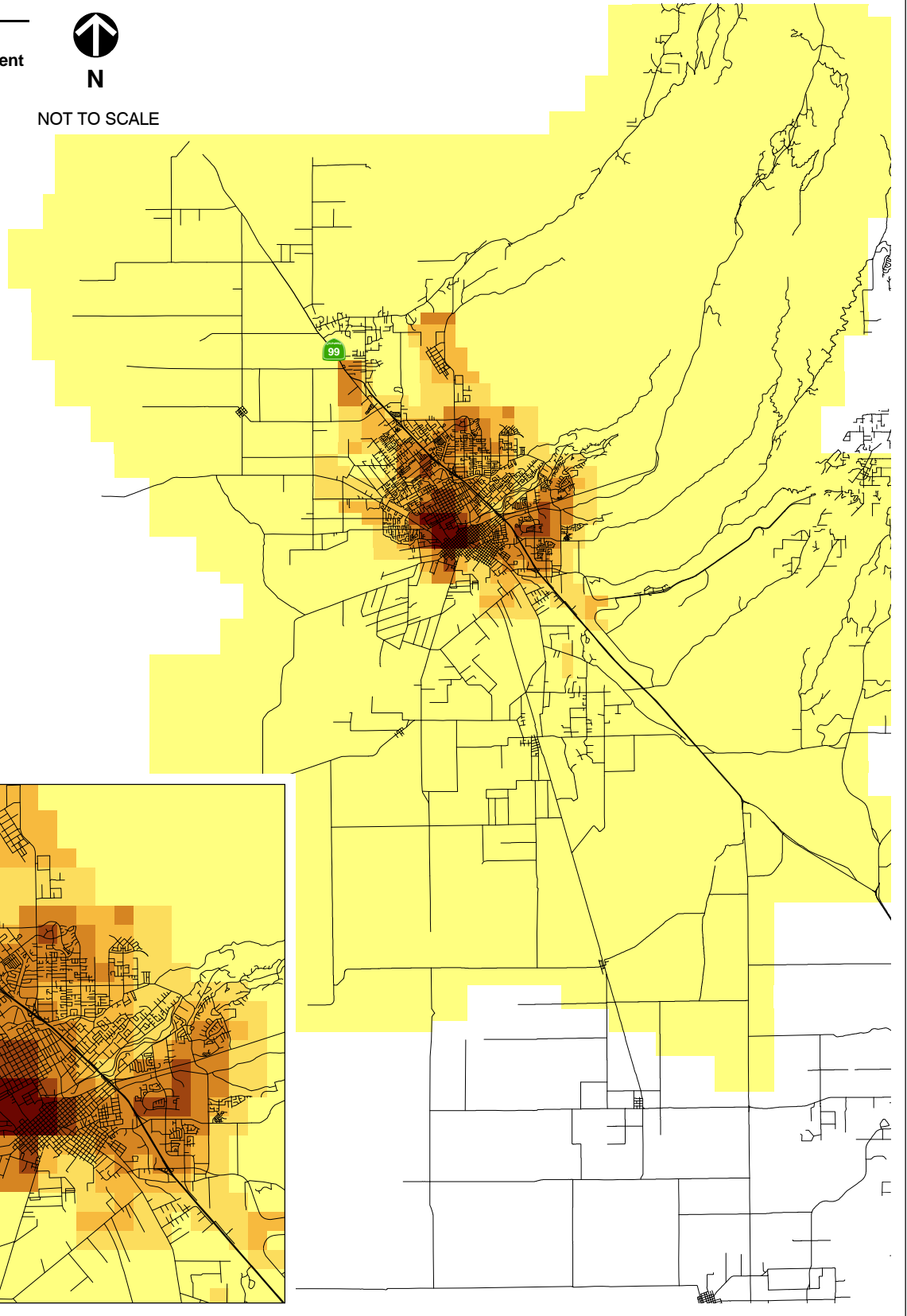
LEGEND

Density Scores -
Population + Employment
per Square Mile

- < 3,000
- 3,000 - 7,000
- 7,000 - 10,000
- 10,000 - 14,000
- 14,000 - 18,000
- > 18,000



NOT TO SCALE



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1994 GENERAL PLAN DENSITY

FIGURE 2A

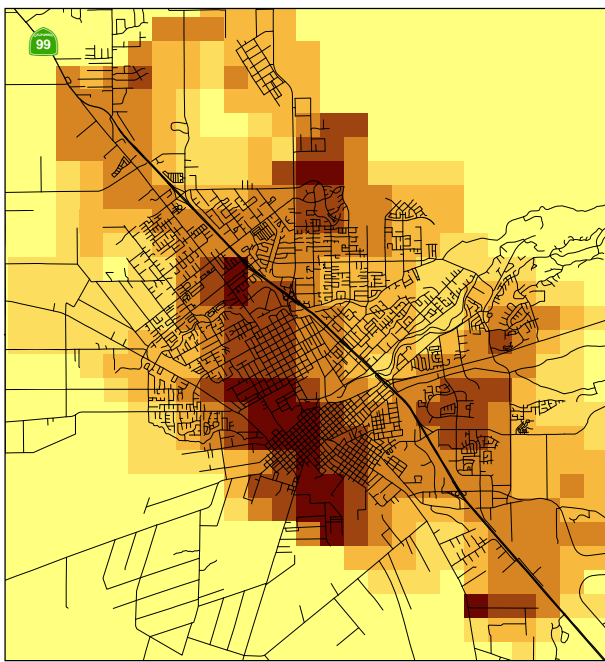
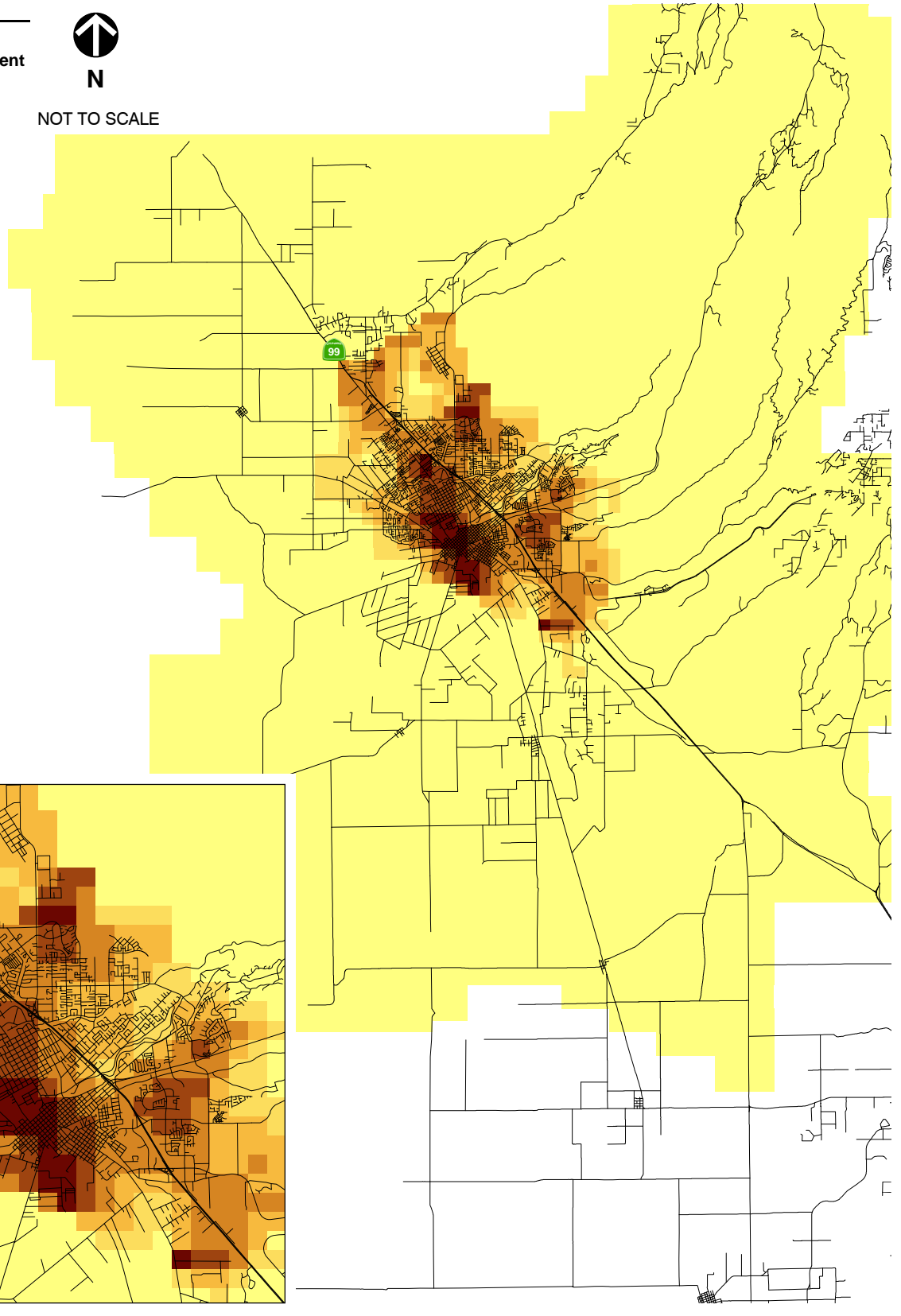
LEGEND

Density Scores -
Population + Employment
per Square Mile

- < 3,000
- 3,000 - 7,000
- 7,000 - 10,000
- 10,000 - 14,000
- 14,000 - 18,000
- > 18,000



NOT TO SCALE



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**PREFERRED LAND USE
ALTERNATIVE DENSITY**

FIGURE 2B

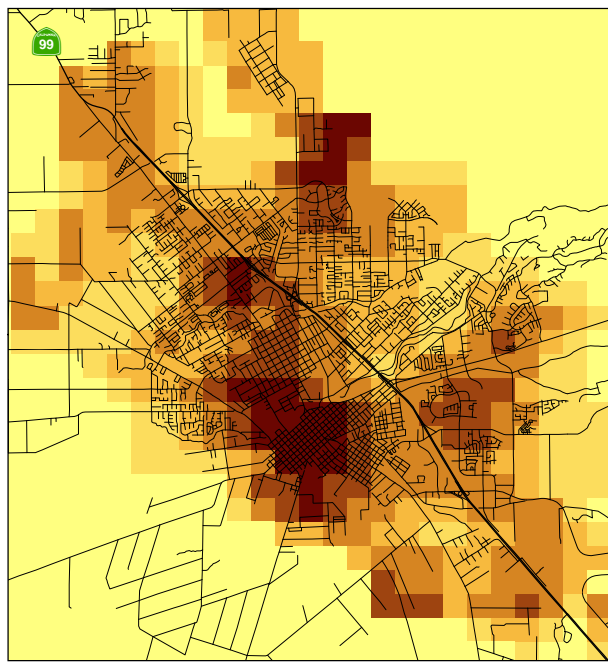
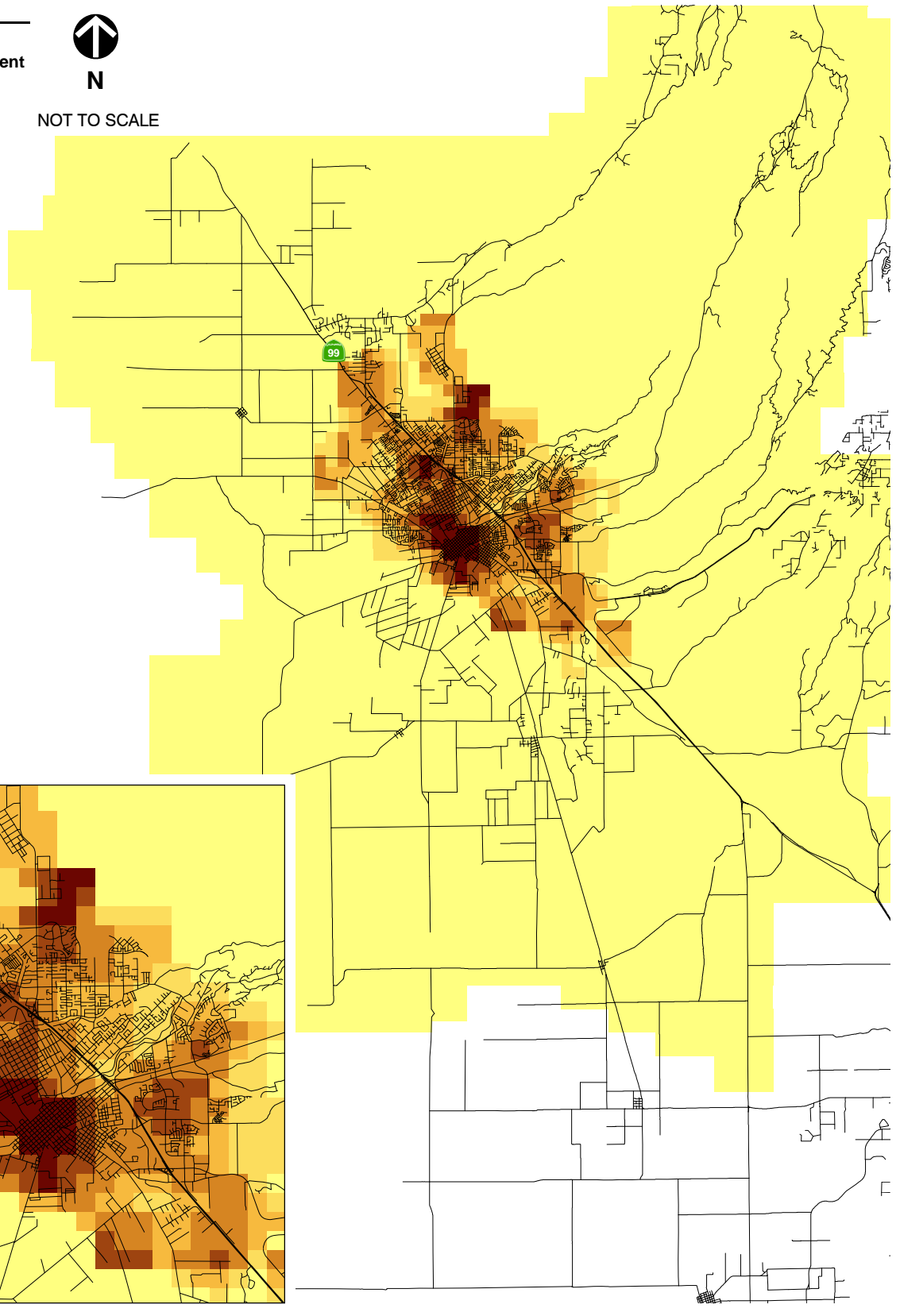
LEGEND

**Density Scores -
Population + Employment
per Square Mile**

- < 3,000
- 3,000 - 7,000
- 7,000 - 10,000
- 10,000 - 14,000
- 14,000 - 18,000
- > 18,000



NOT TO SCALE



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ALTERNATIVE A DENSITY

FIGURE 2C

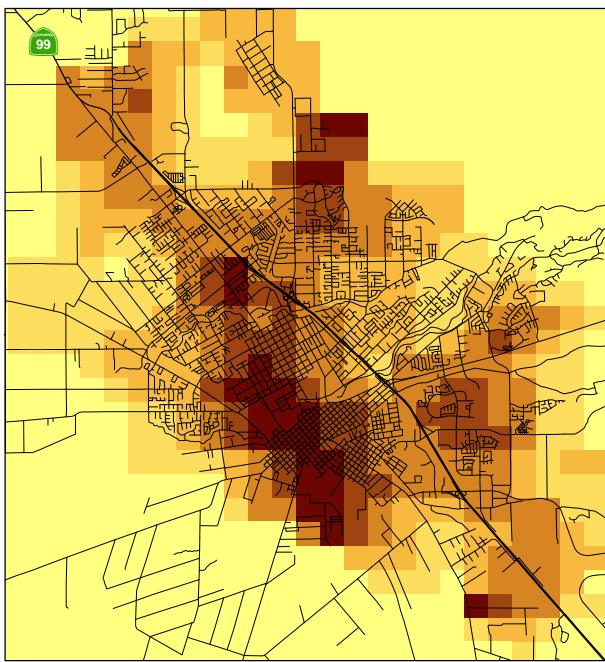
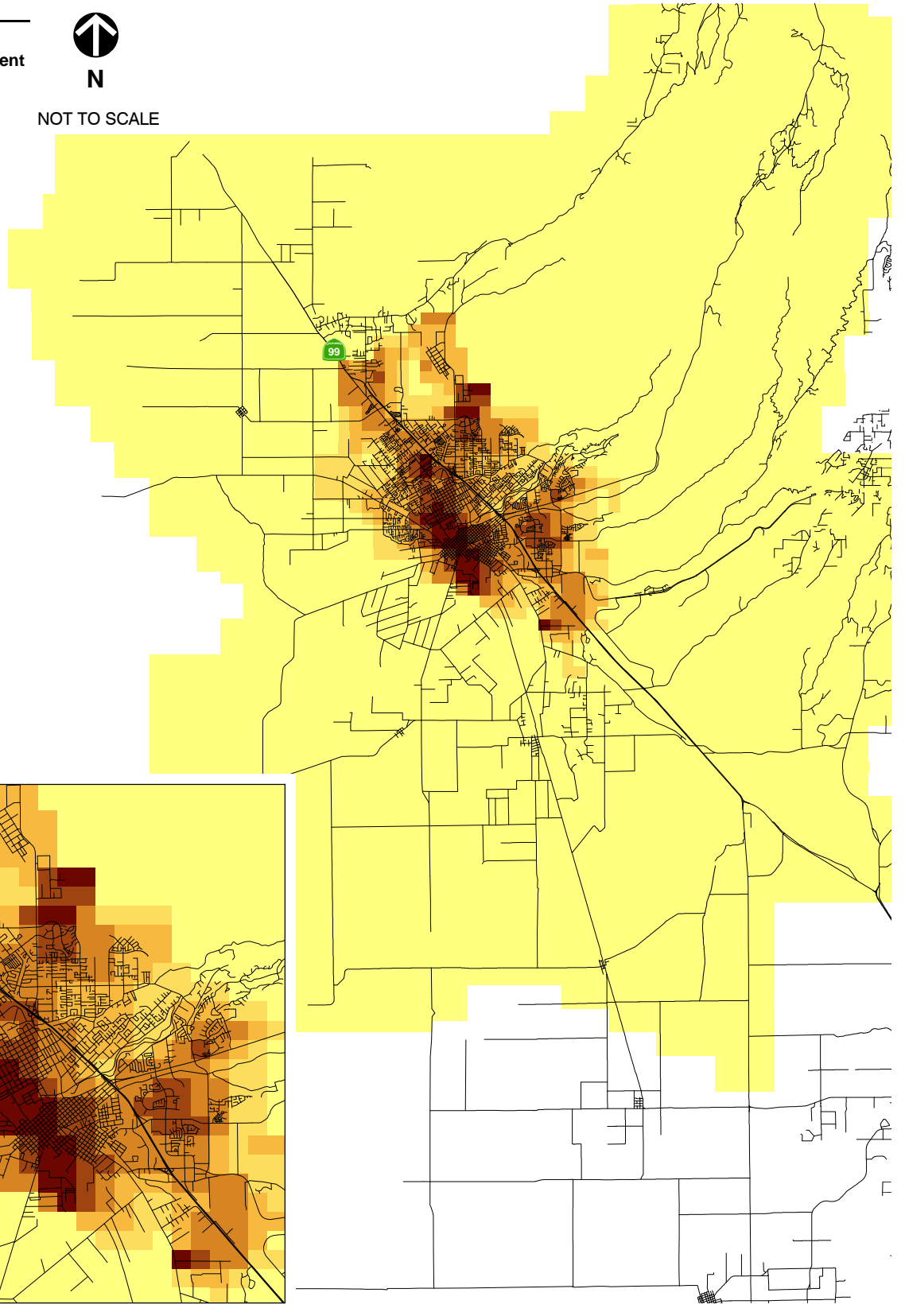
LEGEND

**Density Scores -
Population + Employment
per Square Mile**

- < 3,000
- 3,000 - 7,000
- 7,000 - 10,000
- 10,000 - 14,000
- 14,000 - 18,000
- > 18,000



NOT TO SCALE



FEHR & PEERS
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ALTERNATIVE C DENSITY

FIGURE 2D

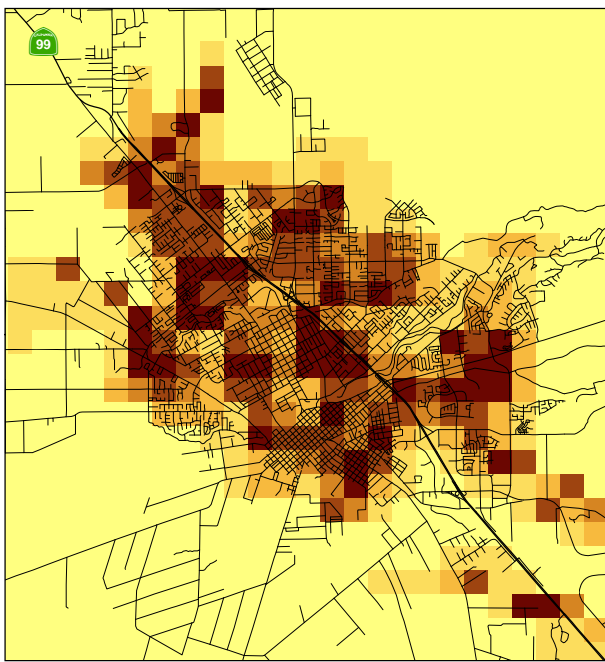
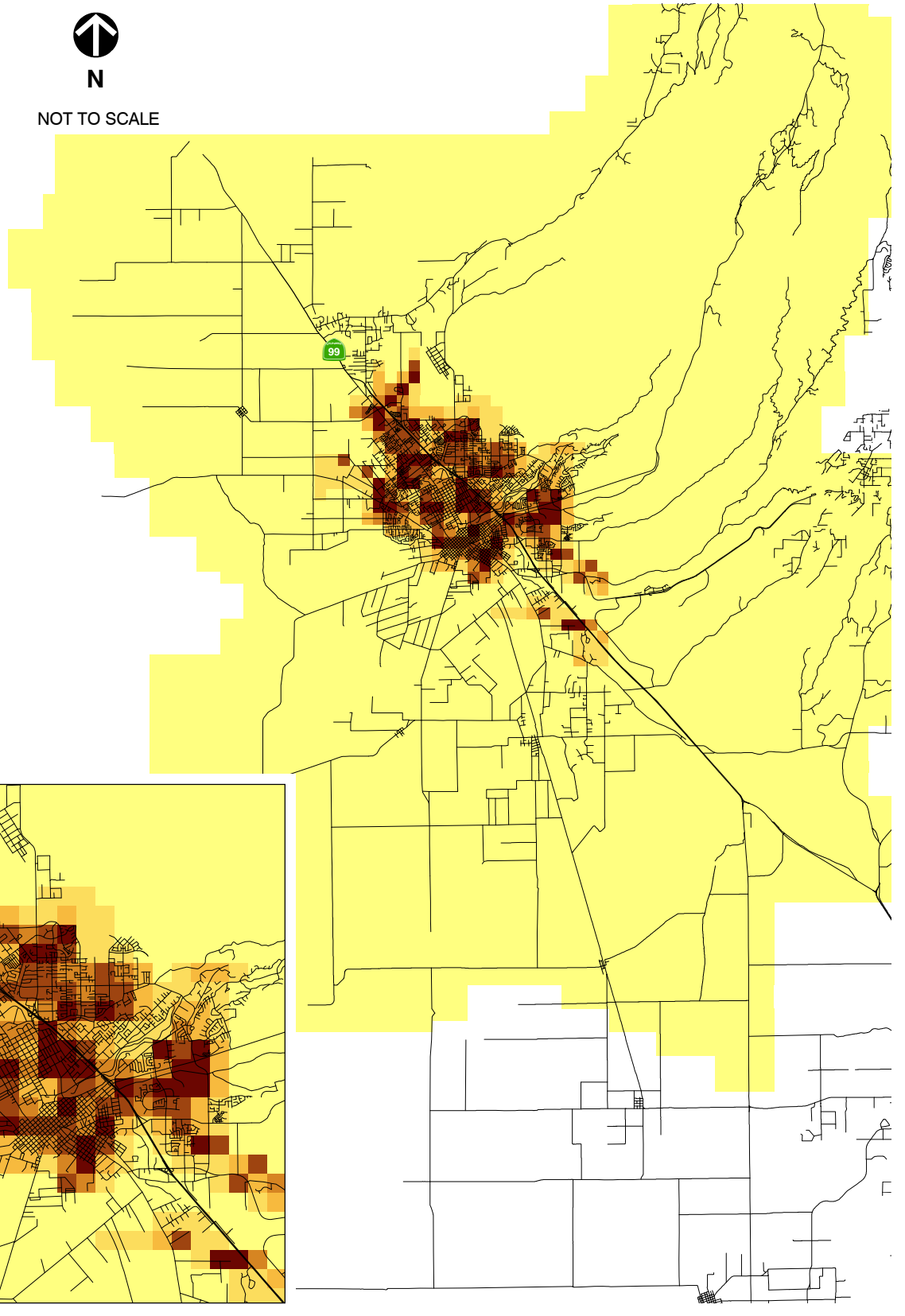
LEGEND

Diversity Scores

- < 0.16
- 0.16 - 0.43
- 0.43 - 0.63
- 0.63 - 0.75
- 0.75 - 0.87
- 0.87 - 1.00









NOT TO SCALE



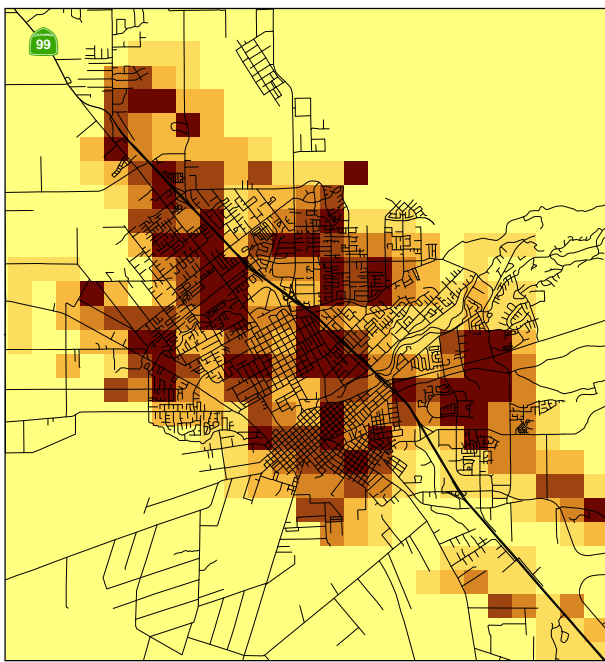
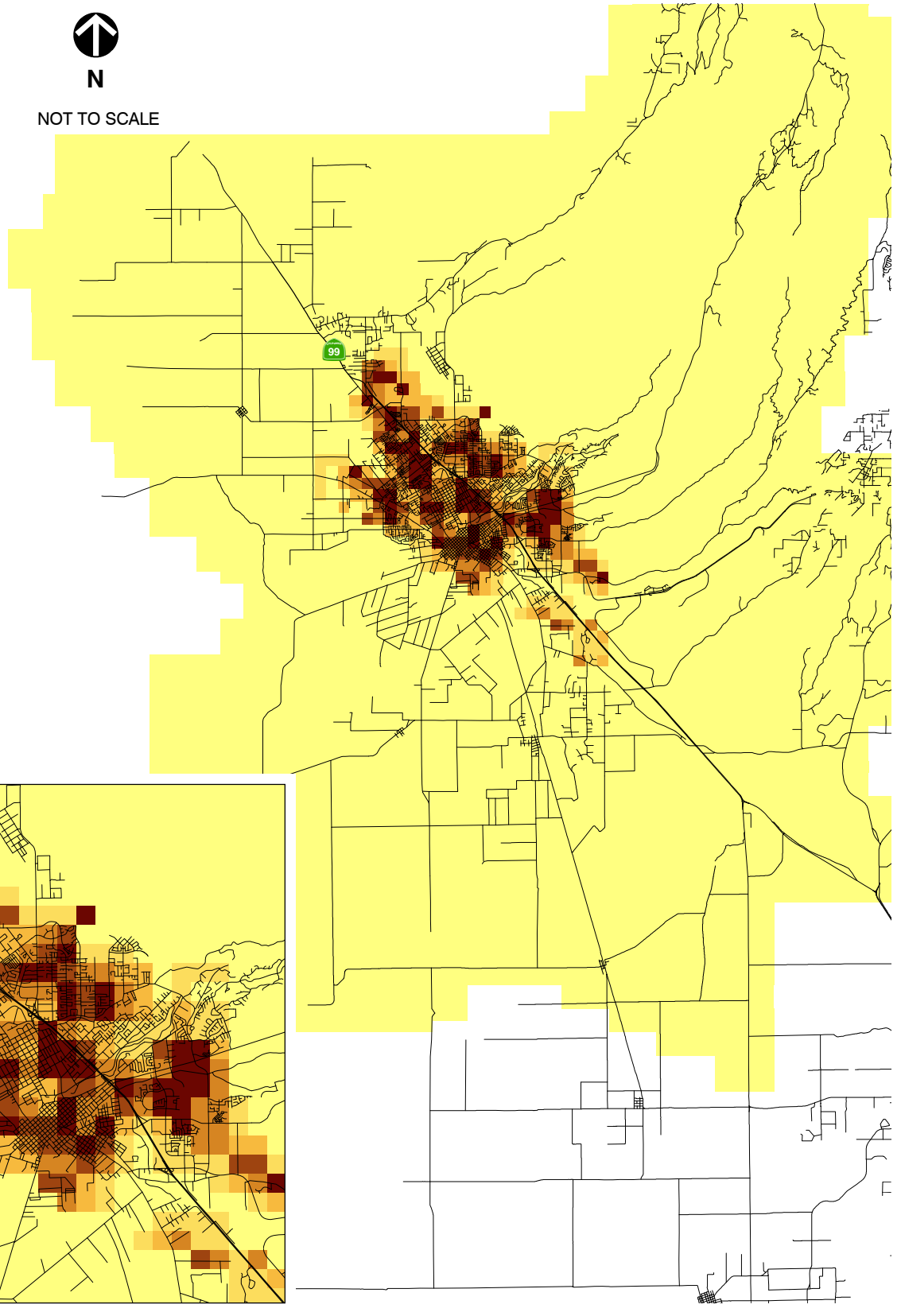
LEGEND

Diversity Scores

-  < 0.16
-  0.16 - 0.43
-  0.43 - 0.63
-  0.63 - 0.75
-  0.75 - 0.87
-  0.87 - 1.00



NOT TO SCALE



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**PREFERRED LAND USE
ALTERNATIVE DIVERSITY**

FIGURE 3B

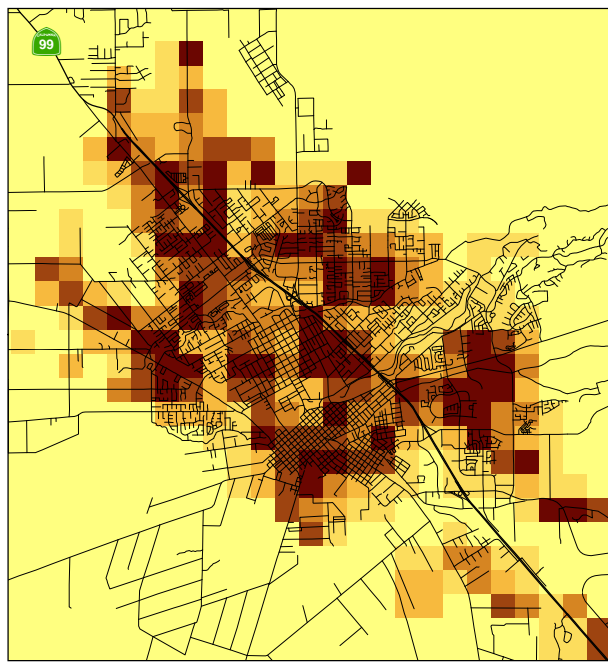
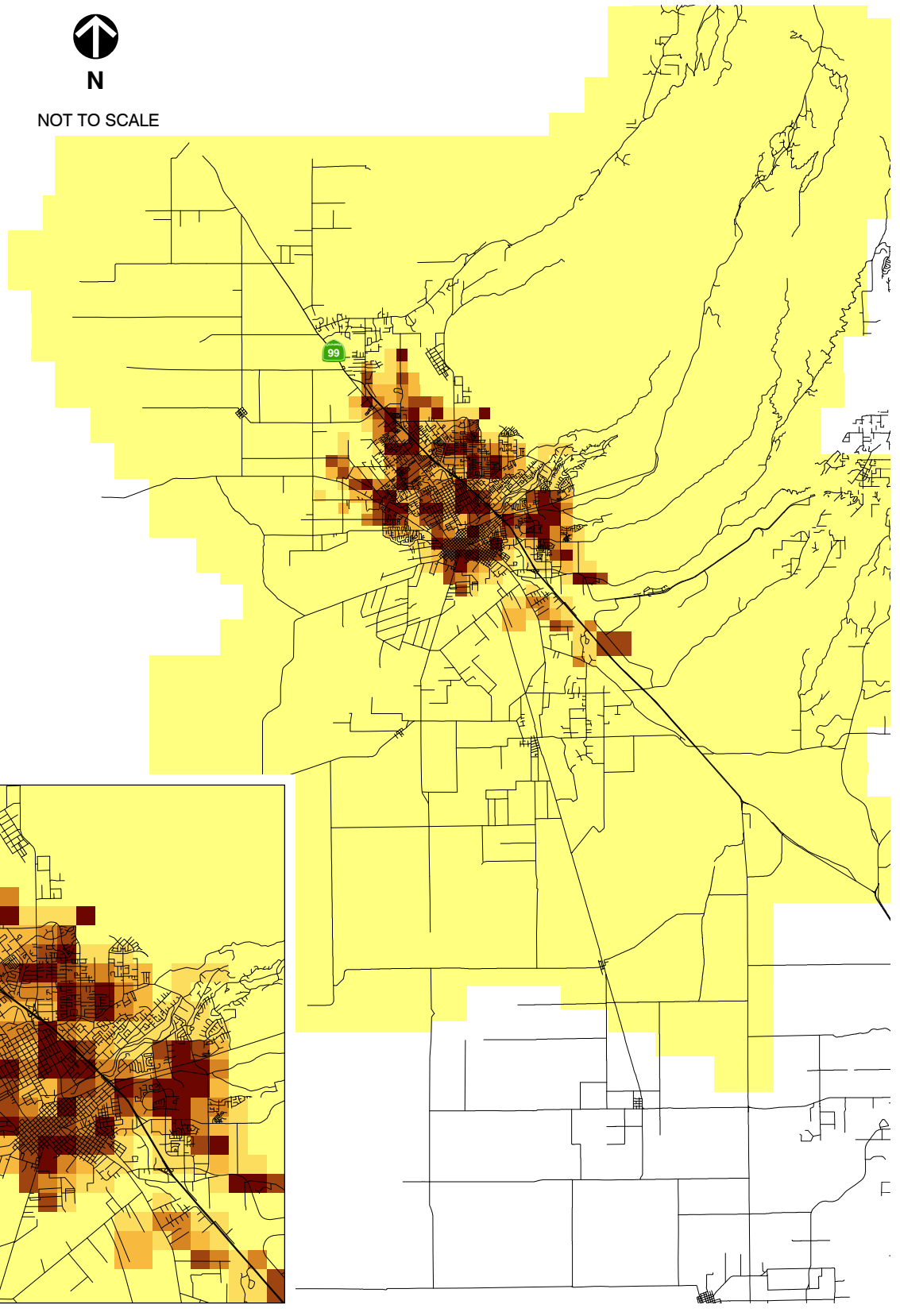
LEGEND

Diversity Scores

- < 0.16
- 0.16 - 0.43
- 0.43 - 0.63
- 0.63 - 0.75
- 0.75 - 0.87
- 0.87 - 1.00









NOT TO SCALE



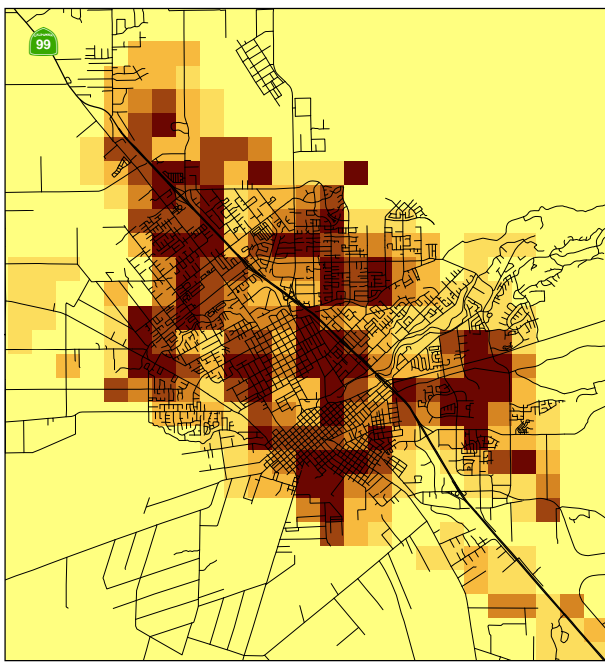
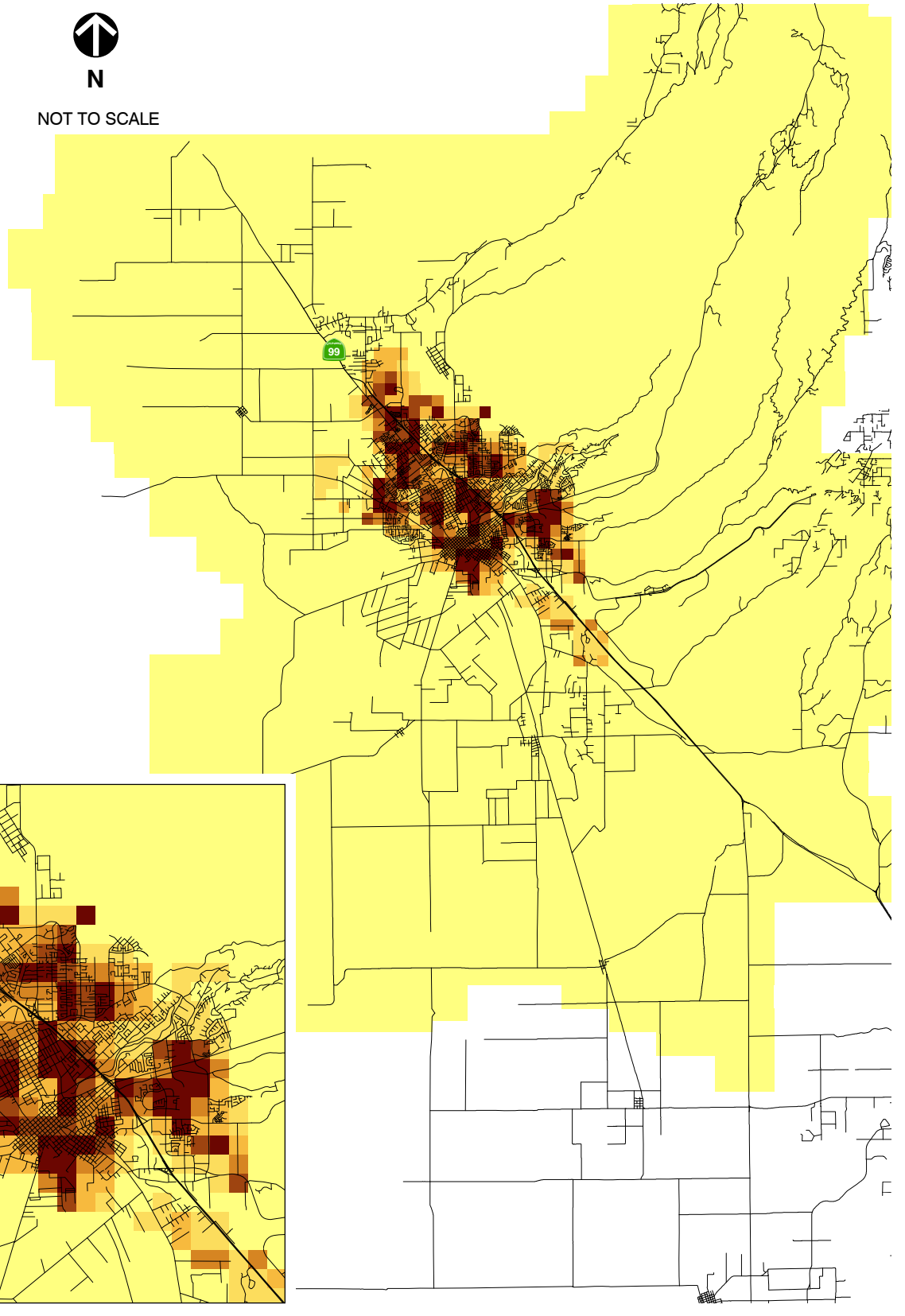
LEGEND

Diversity Scores

	< 0.16
	0.16 - 0.43
	0.43 - 0.63
	0.63 - 0.75
	0.75 - 0.87
	0.87 - 1.00



NOT TO SCALE



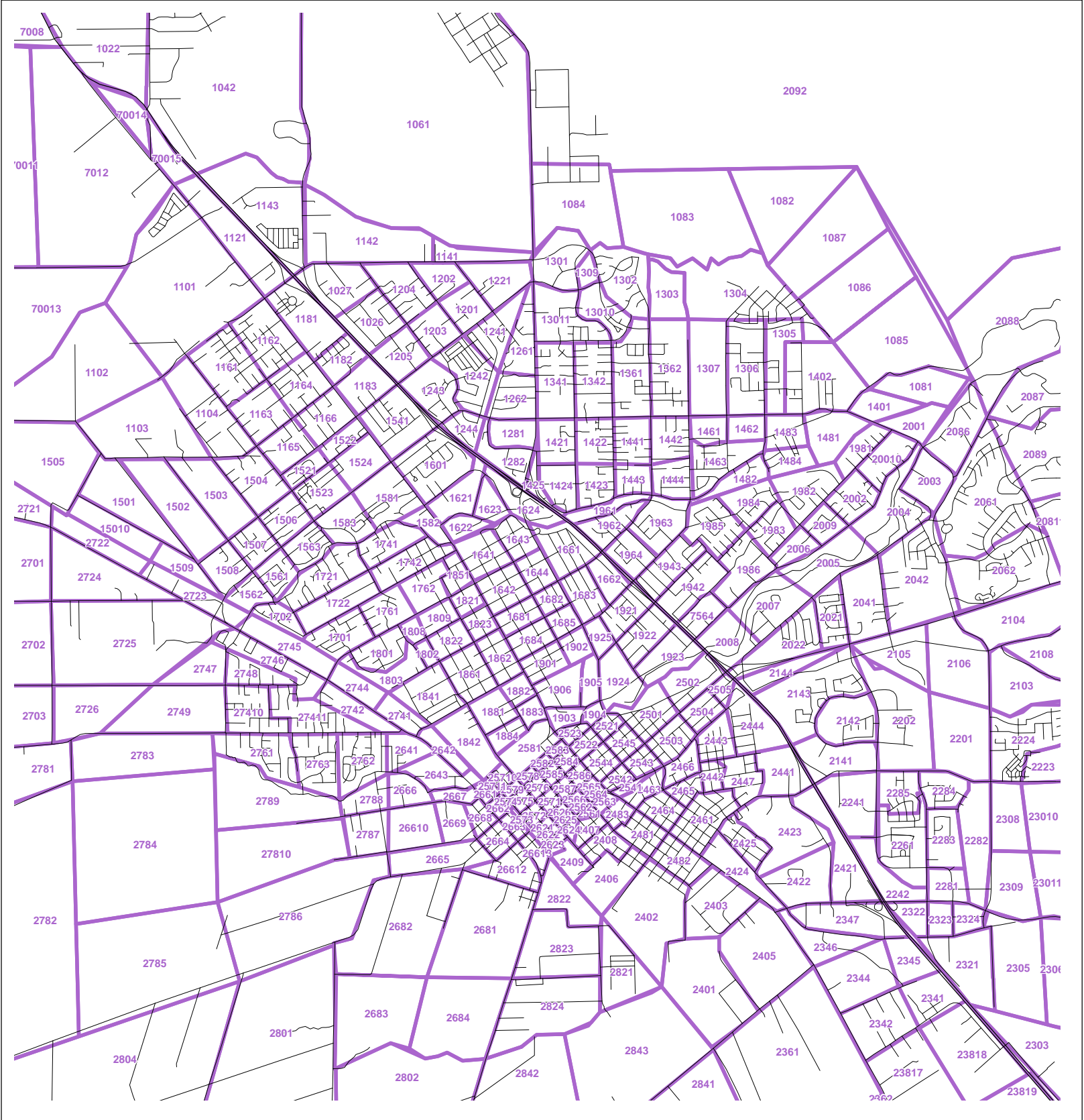
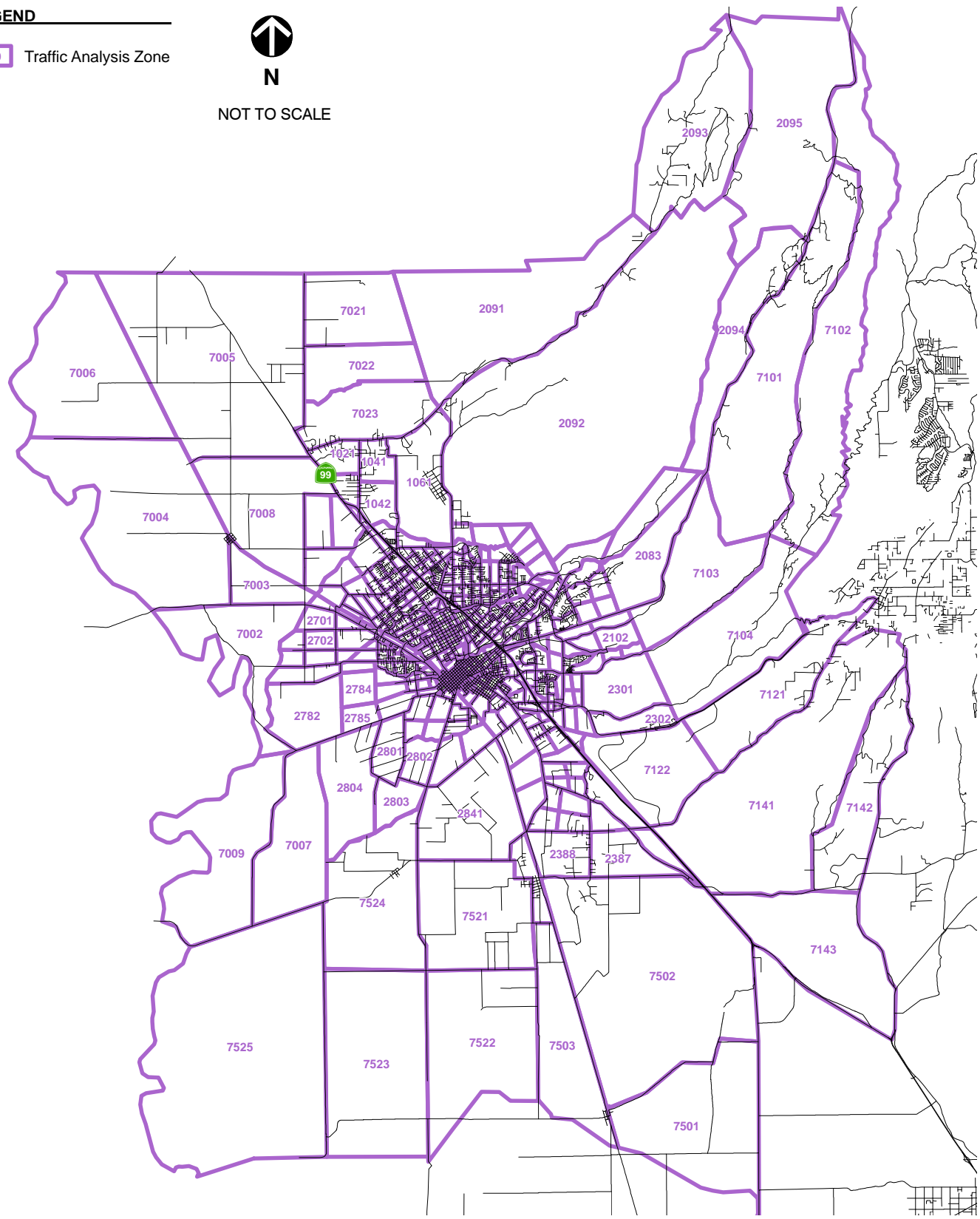
LEGEND

100 Traffic Analysis Zone



N

NOT TO SCALE



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**CHICO TRAVEL DEMAND FORECASTING MODEL
TRAFFIC ANALYSIS ZONES MAP**

FIGURE 4

The design variable differs from the density and diversity variables in that design is based on transportation system data (as opposed to land use data). Specifically the design variable measures the quality of the pedestrian system in terms of sidewalk availability (i.e., does a sidewalk or path exist along a street), block length (shorter blocks encourage walking), and route directness (i.e., shorter walking distances encourage walking). These three measures are combined in a “Design Index” score for an area.

Based on discussions with the City of Chico, a detailed pedestrian infrastructure inventory is not available for the City, so the grid cell calculation technique used for density and diversity was not an option. To calculate the design score, Fehr & Peers worked with City staff to identify seven representative areas based on existing land uses:

- Very low density residential
- Low density residential
- Medium and Medium-High density residential
- Downtown (office and high density residential)
- Community commercial (major retail areas)
- Office
- Manufacturing, warehousing, industrial

The appendix describes the areas in the City that were chosen to represent the land use types described above. Using City street centerline files and aerial photos, Fehr & Peers calculated the design score in GIS. The design score for each of the future year land uses was calculated based on the existing and planned land uses included in each land use alternative. The design scores were then aggregated to TAZ as shown in Figures 5A through 5D.

The final D, access to regional destinations, is defined by how many retail, employment, school, and recreational opportunities are near a home or business. For example, the destinations score for neighborhoods near downtown Chico is much higher when compared to neighborhoods near the airport. The accessibility of regional destinations is calculated by the trip distribution module of the Chico TDF model. No additional off-model calculations or modifications are required to account for the destinations element of the 4Ds.

Design Defined

Below is the specific definition for design:

$$\text{Design} = 0.0195 \times s + 1.18 \times c + 3.63 \times z$$

s = length of street centerline in miles / area of neighborhood in square miles

c = total length of sidewalks in neighborhood / $2 \times$ street centerline length

z = airline distance to center of neighborhood / average road distance to center of neighborhood

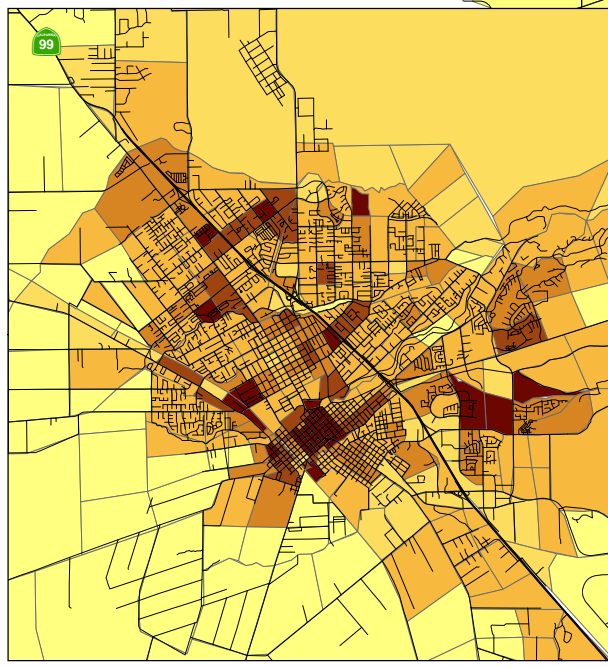
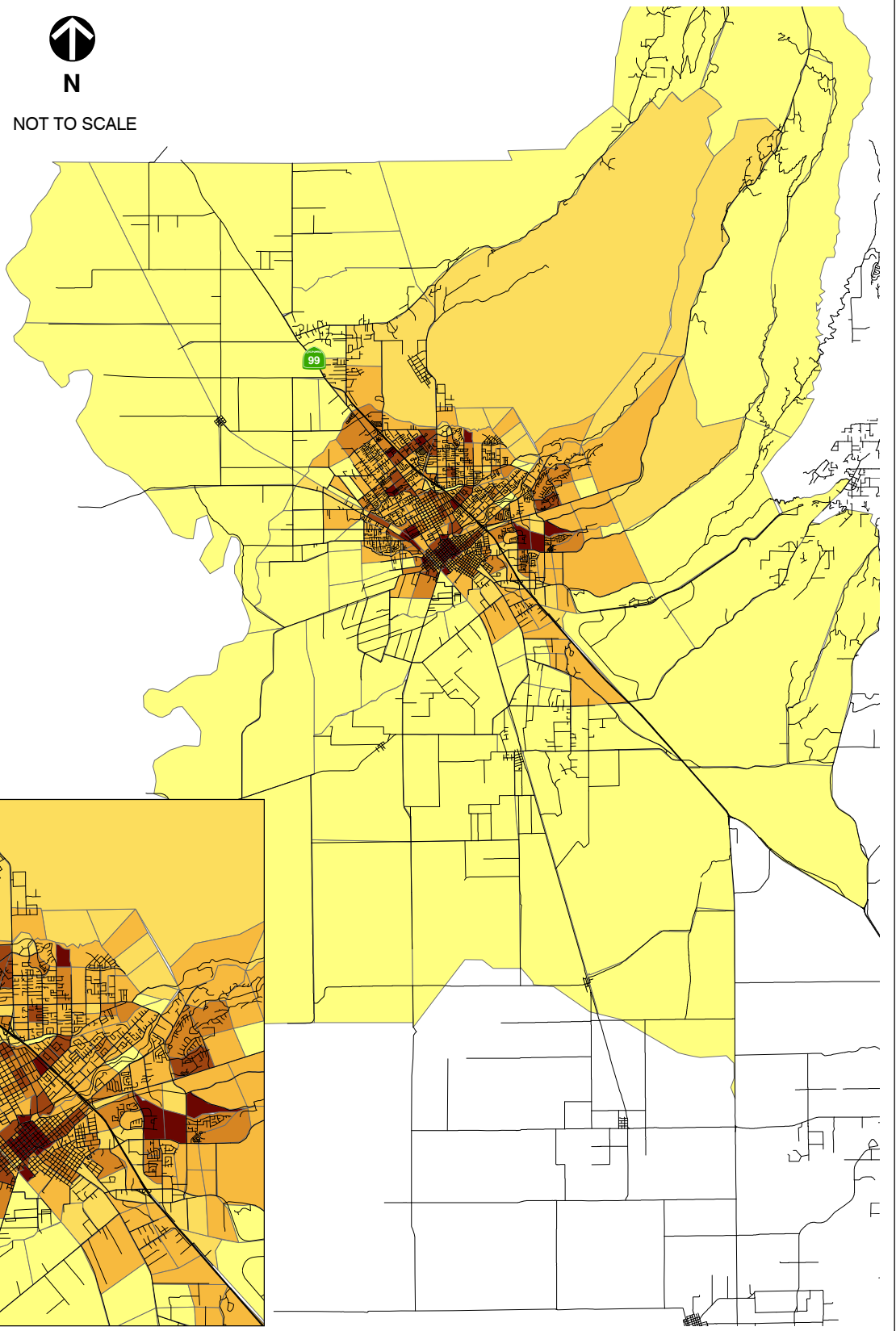
LEGEND

Design Score

- 0.000000
- 0.000001 - 3.975000
- 3.975001 - 4.107700
- 4.107701 - 4.170700
- 4.170701 - 4.268800
- 4.268801 - 4.590000



NOT TO SCALE



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1994 GENERAL PLAN DESIGN

FIGURE 5A

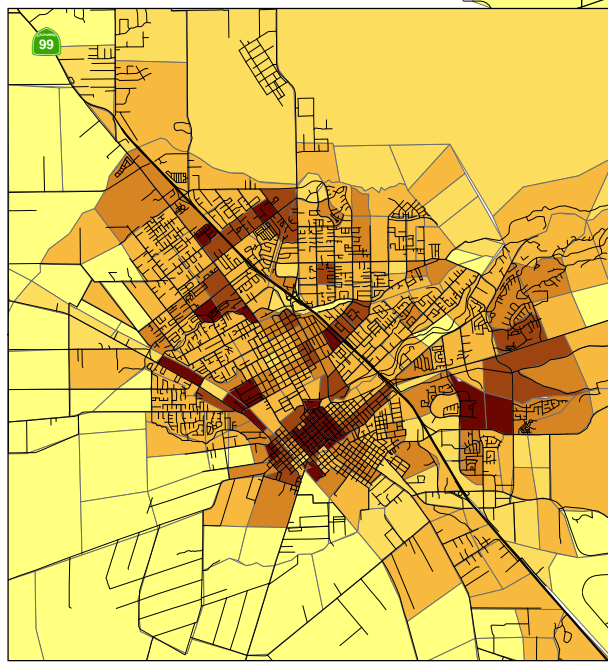
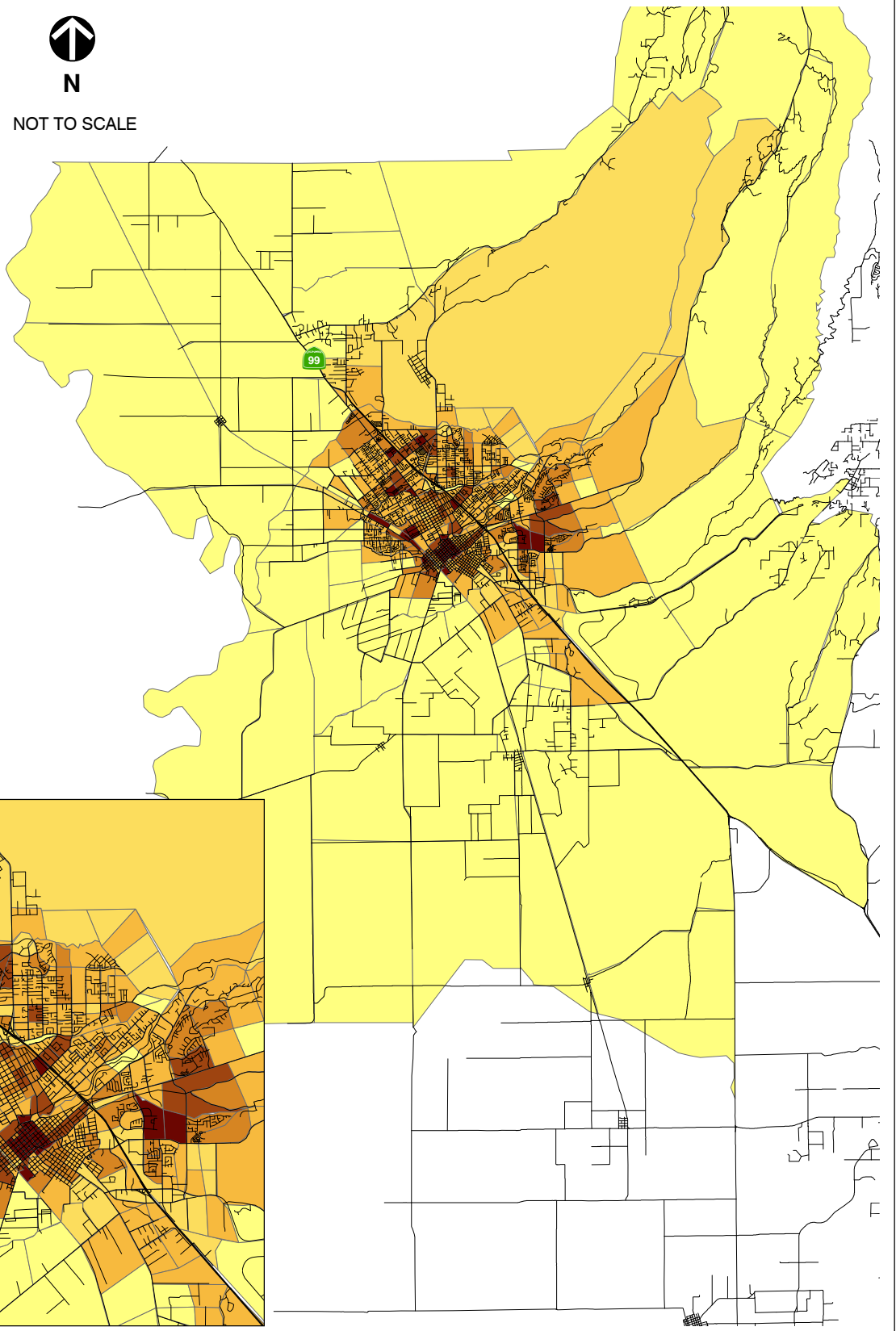
LEGEND

Design Score

- 0.000000
- 0.000001 - 3.975000
- 3.975001 - 4.107700
- 4.107701 - 4.170700
- 4.170701 - 4.268800
- 4.268801 - 4.590000



NOT TO SCALE



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**PREFERRED LAND USE
ALTERNATIVE DESIGN**

FIGURE 5B

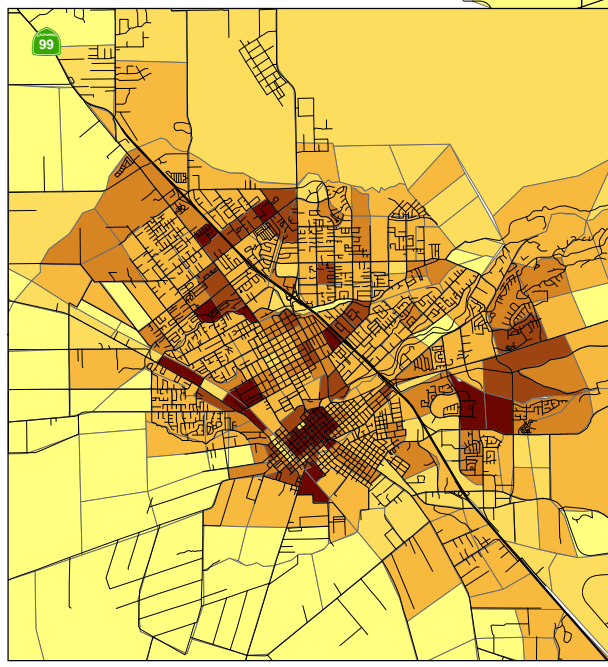
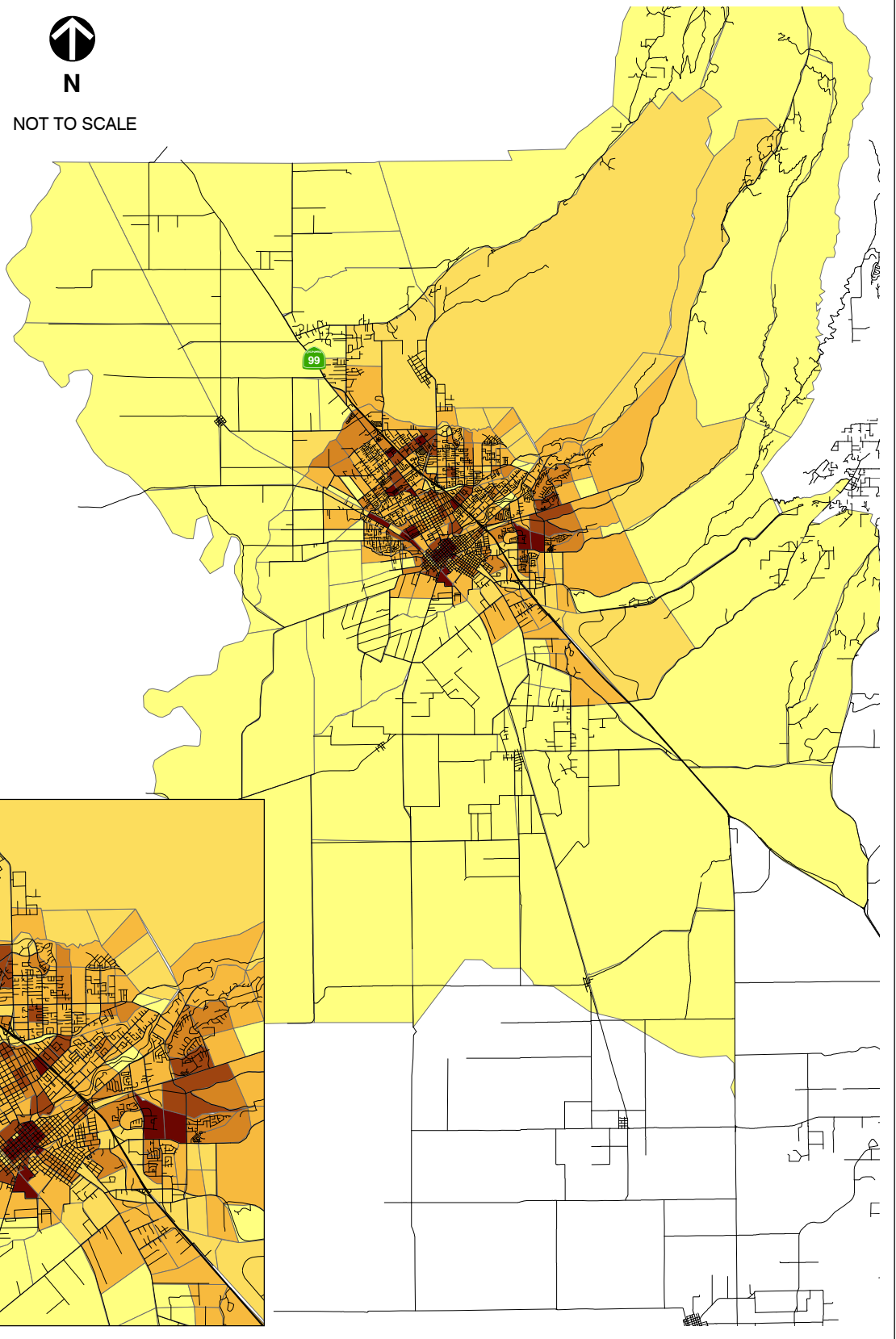
LEGEND

Design Score

- 0.000000
- 0.000001 - 3.975000
- 3.975001 - 4.107700
- 4.107701 - 4.170700
- 4.170701 - 4.268800
- 4.268801 - 4.590000



NOT TO SCALE



FEHR & PEERS
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ALTERNATIVE A DESIGN

FIGURE 5C

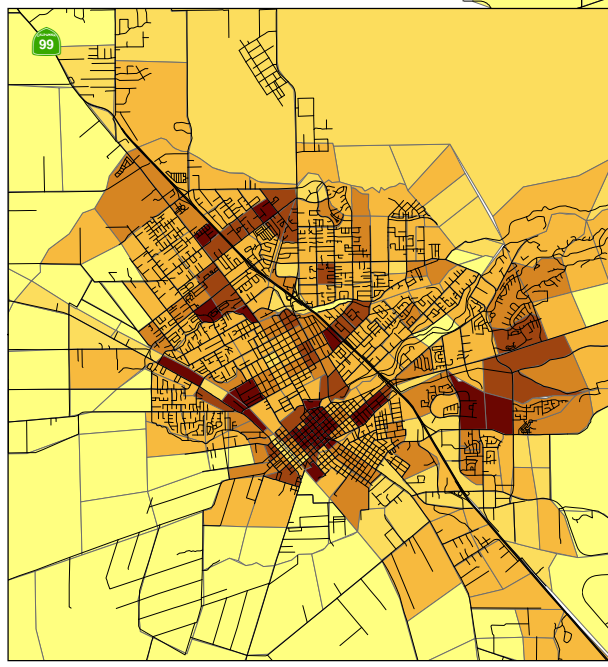
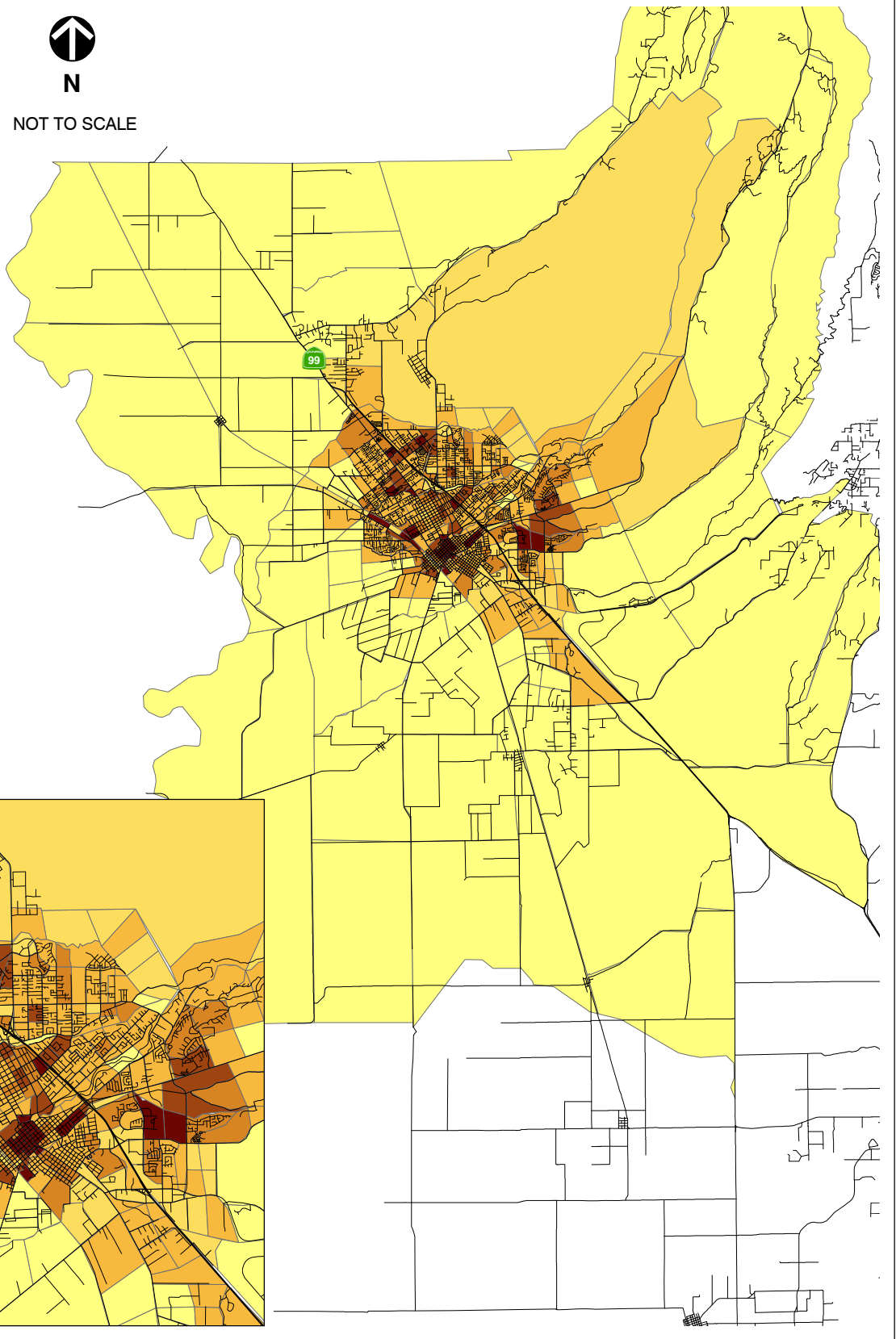
LEGEND

Design Score

- 0.000000
- 0.000001 - 3.975000
- 3.975001 - 4.107700
- 4.107701 - 4.170700
- 4.170701 - 4.268800
- 4.268801 - 4.590000



NOT TO SCALE



FEHR & PEERS
TRANSPORTATION CONSULTANTS

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ALTERNATIVE C DESIGN

FIGURE 5D

IMPLEMENTING THE 4D ADJUSTMENTS IN THE CHICO TDF MODEL

Implementation of the 4D adjustments in the Chico TDF model was carried out with a spreadsheet tool. As shown in Figure 6, the 4D spreadsheet tool uses density, diversity, and design input data for each TAZ for the baseline condition (1994 General Plan Buildout) and a test condition (Preferred Land Use Alternative, Alternative A, and Alternative C). The 4D spreadsheet calculates the percent difference in each D variable and then multiplies that change by the appropriate D elasticity. This calculation is performed for each TAZ in the model. Finally, the total change in vehicle trips related to each D variable is calculated to obtain the overall trip reduction caused by the urban form of the TAZ. The trip adjustments for each of the test land use scenarios (Preferred Land Use, Alternative A, and Alternative C) were calculated in separate 4D spreadsheets.

1	A	B			C			D			E			F			G			Percent difference between Alt. A. and 1994 GP scenarios			K	L	M
		Test_Scenario_INPUT			Base_Scenario_INPUT			Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	4Ds Ac					
2	TAZ	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design
3	1021	7355.1020	1.96975	4.1387	5324.250452	0.92508	3.9662	38.14%	5.40%	4.35%	-1.53%	32%	-0.09%												
4	1022	9908.716122	1.65376	4.15	10251.85006	0.08809	4.09	-3.35%	19.62%	1.47%	0.13%	18%	-0.03%												
5																									
6																									
7																									
8	1042	11341.59801	0.142245	4.0413																					
9	1061	6533.130898	0.713746	4.0952	2633.162881	0.35902	3.83	130.59%	-25.58%	6.92%	-5.22%	1.53%	-0.14%												
10	1081	3894.204117	0	4.1054	3894.204117	0	3.83	0.00%	0.00%	7.19%	0.00%	0.00%	-0.14%												
11	1082	0	0	4.09	0	0	3.83	0.00%	0.00%	6.79%	0.00%	0.00%	-0.14%												
12	1083	8358.390687	0.506439	4.0773	8783.975547	0.29069	3.9955	-4.85%	74.22%	2.05%	0.19%	-4.45%	-0.04%												
13	1084	6195.74153	0.264733	4.09	6336.359997	0.41961	3.83	-2.22%	-36.91%	6.79%	0.09%	2.21%	-0.14%												
14																									

Figure 7 – 4D Adjustment Calculation Spreadsheet

Additional rules governing outlier data were also incorporated into the 4D calculation spreadsheets. Research indicates that there are diminishing returns when increasing D variables beyond a certain point. In other words, increasing the density of typical suburban development would be expected to lead to a reduction in trip generation per capita; however, increasing the density of a major downtown area like San Francisco would not lead to a similar trip generation reduction since many trips are already made with other modes. Special rules known as “floors and ceilings” limit the extent of the 4D adjustments where there are unusually large differences between the baseline and test scenarios. The floor and ceiling limits used in this analysis are defined in Table 2 and were developed by Fehr & Peers for previous 4D applications for SACOG, SJCOG, SLOCOG, Kern COG, and other regional and local agencies.

TABLE 2 - FLOOR AND CEILING ADJUSTMENT LIMITS	
Floor/Ceiling Category	Maximum Allowable Change
Maximum Percent Change Considered for any D Variable	±500%
Maximum Allowed Trip Generation Adjustment for Any Individual D Variable	±30%
Maximum Allowed Total Combined Adjustment	±25%
Source: Fehr & Peers 2010.	

In addition to the floor and ceiling limits, special rules were applied in certain “greenfield” development areas. For example, if the one of the test land use scenarios proposes to have

development in an area that does not have any development in the baseline scenario, no 4D adjustment was made. Not applying the 4D adjustments in these cases makes sense because measuring the change in D variables from undeveloped land to developed land is not meaningful and would result in an overstatement of trip reductions in the new greenfield areas. The full 4D spreadsheets showing the vehicle trip adjustment per TAZ for each of the test land use scenarios are presented in the appendix.

RESULTS OF THE 4D MODEL RUNS

With the vehicle trip adjustment for each TAZ defined, we used these factors to adjust the number of vehicle trips in the Chico VISUM TDF model. The updated vehicle trips were then assigned to the roadway network to produce smart growth-sensitive forecasts of roadway link volumes, total daily vehicle trips, and total daily VMT.

The results in Table 3 summarize the total daily VMT and VMT per household for the 1994 General Plan, the Preferred Land Use Alternative, Alternative A, and Alternative C. While total VMT summarizes the amount of travel for a given land use scenario, the VMT per household measure is potentially more telling since it is a measure of travel efficiency. All households must travel to go to work, school, shop, and recreate; fewer and shorter vehicle trips (i.e., less VMT) represents a more energy efficient and less carbon intensive travel scenario.

TABLE 3 - CHICO TDF MODEL 4D DAILY VMT RESULTS				
Scenario	Total VMT	Households	VMT per Household	Difference in VMT per Household Compared to 1994 General Plan
1994 General Plan	3,448,831	54,280	64	N/A
Preferred Land Use Plan	3,549,941	62,933	56	-11%
Alternative A	3,670,142	67,123	55	-14%
Alternative C	3,500,948	59,344	59	-7%

Source: Fehr & Peers 2010.

The results in Table 3 are somewhat mixed. In terms of total VMT, Alternative A has the greatest overall VMT, while the 1994 General Plan scenario has the least overall VMT. These results are not surprising given that Alternative A has the greatest number of households (and therefore represents the scenario with the most new growth), while the 1994 General Plan alternative has the fewest number of households. The Preferred Land Use and Alternative C fall in between Alternative A and the 1994 General Plan when it comes to total VMT.

In terms of VMT per household, the situation is reversed. The 1994 General Plan alternative has the highest VMT per household at 64 miles, while Alternative A has the lowest VMT per household, at 55 miles (14 percent less). The fact that the 1994 General Plan alternative has the greatest VMT per household (and is therefore the least travel efficient) is not surprising given the relatively sprawling, low density land use pattern outlined in the 1994 General Plan. All the new land use alternatives considered as part of the General Plan update have substantially lower VMT per household.

It came as a surprise that Alternative A generated less VMT per household than Alternative C. It was anticipated that the more compact Alternative C land use plan would have the lowest VMT

per household. A closer look at the 4D data indicates that while Alternative C is denser than Alternative A, the latter alternative is slightly more diverse and has a better design score¹. While the density, diversity, and design scores vary somewhat between Alternative A and Alternative C, these variations are too small to explain the difference in VMT per household.

A potential reason for Alternative A's lower VMT is related to the distribution of land uses. Specifically, Alternative A's larger development footprint places work and retail opportunities closer to Oroville and Paradise. These Butte County communities rely on Chico for regional shopping and employment and a substantial amount of travel (and VMT) occurs between Chico and these locations. By placing work and shopping choices closer to Paradise and Oroville, the VMT between Chico and these other communities could be reduced.

To test this hypothesis, the VMT related to travel that occurs entirely within the City of Chico was isolated using the Chico VISUM TDF model. In this way, the effects of travel between Chico and other areas in Butte County are removed and the effects of the different land use alternatives can be evaluated for City of Chico travel exclusively. The results of this internal travel analysis are presented in Table 4.

TABLE 4 - INTERNAL CITY OF CHICO DAILY VMT RESULTS		
Scenario	Internal VMT per Household	Difference in VMT Compared to 1994 General Plan
1994 General Plan	32.0	N/A
Preferred Land Use Plan	28.2	-12%
Alternative A	28.4	-11%
Alternative C	28.0	-13%

Source: *Fehr & Peers 2010.*

The results in Table 4 confirm the hypothesis that the distribution of land uses in Alternative A provides significant regional benefits to VMT². However, as can be seen in Table 4, Alternative C is the most efficient land use alternative in terms of travel within the City of Chico (however, all the land use alternatives considered as part of the latest General Plan update are relatively efficient). This result is consistent with general expectations since Alternative C has the most compact land use form.

CONCLUSIONS

The results presented in this memorandum demonstrate that the land use alternatives developed for the latest General Plan Update (Preferred Land Use, Alternative A, and Alternative C), are considerably more dense, more diverse, have better pedestrian design, and have better access to regional destinations when compared to the 1994 General Plan land use alternative.

The Preferred Land Use Plan represents a good compromise between the more compact Alternative C land use plan and the Alternative A land use plan, which accommodates more residents and has a larger development footprint. As shown in Tables 3 and 4, the Preferred

¹ Alternative A: density = 10,140, diversity 0.495, design 3.31; Alternative C: density 10,400, diversity 0.485, design 3.22.

² Note that while providing retail and employment opportunities closer to the edge of an area can reduce the travel of the residents that live near the edge of the community (and the residents that live outside and commute into the area), this type of development can have long-term growth inducing impacts by making it more convenient to live near the urban fringe.

Land Use Plan strikes a balance in terms of minimizing VMT for both regional and local travel, while archiving all the other goals stated in the General Plan.

Overall, the reductions in VMT related to the Preferred Land Use Plan are consistent with the results of similar efforts conducted in other parts of California. Specifically, as part of the Sacramento Regional Blueprint planning process, a VMT reduction of 12 percent is anticipated in comparison to business as usual conditions. Blueprint planning in the San Joaquin Valley and San Louis Obispo area are also anticipating similar reductions in VMT per household. These similarities, combined with the nationally validated relationships between urban form and VMT used in this analysis demonstrate that the 4D adjustments are required to give a more accurate assessment of VMT, air pollution emissions, and greenhouse gas emissions related to transportation and land use.

Appendix

TABLE A1 - CHICO GENERAL PLAN LAND USE CATEGORIES	
Chico Land Use Category	Description
CC	Community Commercial (1994 General Plan Category Only)
CMU	Commercial Mixed Use
CMU DT	Commercial Mixed Use (Downtown)
CS	Commercial Services
D	Downtown
DRMU	Downtown Retail Mixed Use
DM	Diamond Match (1994 General Plan Category Only)
HDR	High Density Residential
IOMU	Industrial Office Mixed Use
IP/POS	Industrial Park / Primary Open Space (1994 General Plan Category Only)
LDR	Low Density Residential
LDR/POS	Low Density Residential / Primary Open Space
LW	Live Work
MDR	Medium Density Residential
MDR/POS	Medium Density Residential / Primary Open Space
MHDR	Medium/High Density Residential
MUNC	Mixed Use Neighborhood Core
MW	Manufacturing and Warehouse
MW/POS	Manufacturing and Warehouse / Primary Open Space
NC	Neighborhood Commercial
OFF	Office (1994 General Plan Category Only)
OMU	Office Mixed Use
OMU DT	Office Mixed Use (Downtown)
PFS	Public Facilities and Services
RC	Regional Commercial
RMU	Residential Mixed Use
RMU DT/TC	Residential Mixed Use (Downtown)
RMUH	Residential Mixed Use - High Density
SMU	Special Mixed Use
VLDR	Very Low Density Residential
VLDR/POS	Very Low Density Residential / Primary Open Space
POS	Primary Open Space
ROW	Right-of-way
SOS	Secondary Open Space

TABLE A2 - NEIGHBORHOODS SELECTED FOR DESIGN SCORE CALCULATION

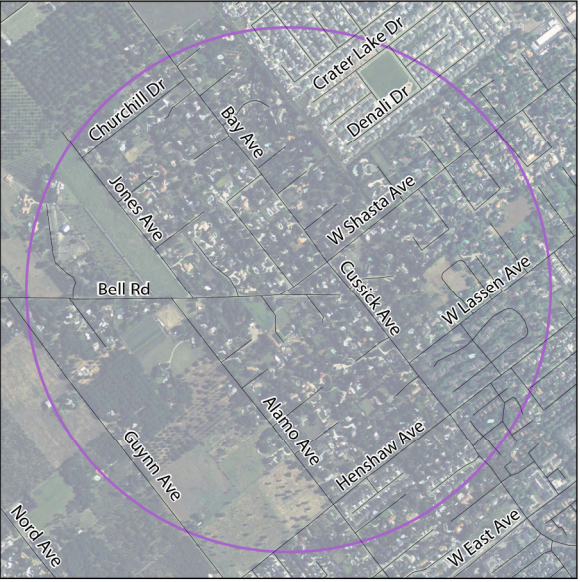
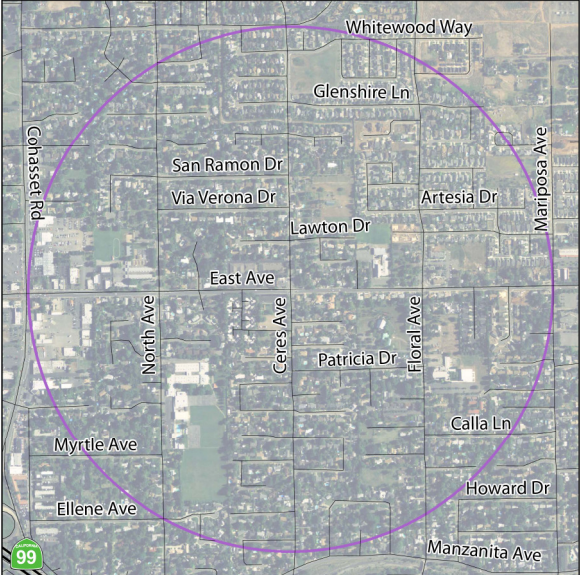
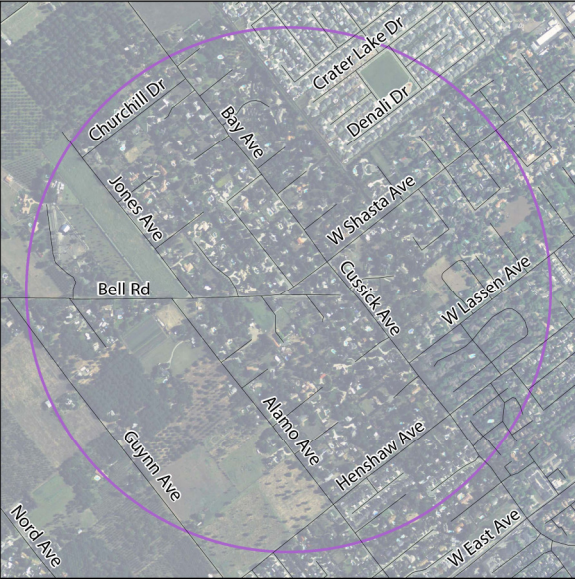
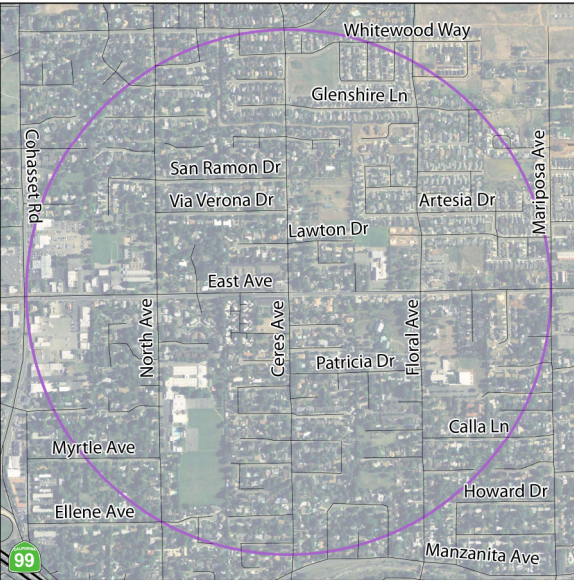
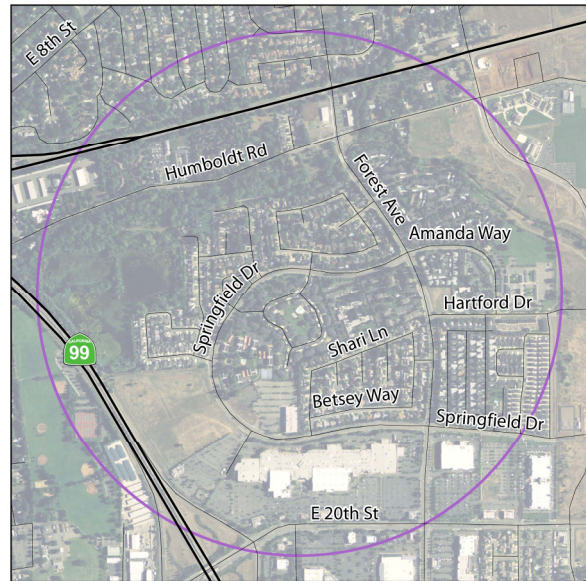
Neighborhood and Calculated Design Score	Map of Area Selected For Evaluation
<p>Very Low Density Residential Design Score = 4.00</p>	
<p>Low Density Residential Design Score = 4.09</p>	

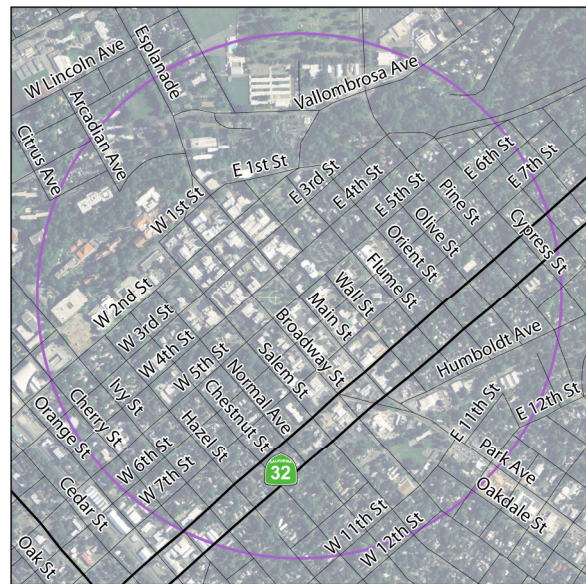
TABLE A2 - NEIGHBORHOODS SELECTED FOR DESIGN SCORE CALCULATION

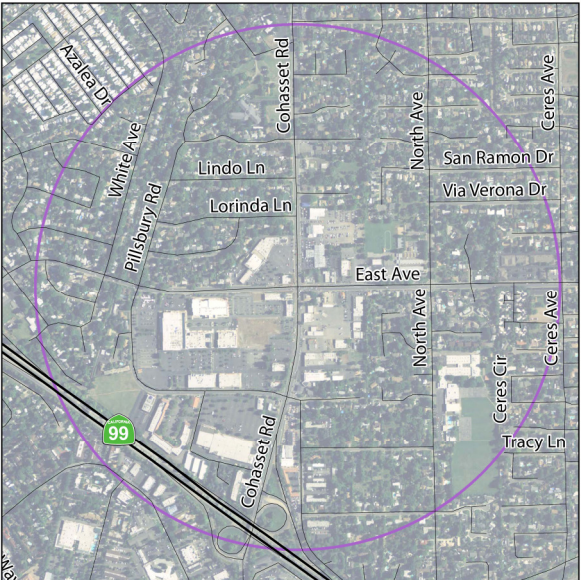
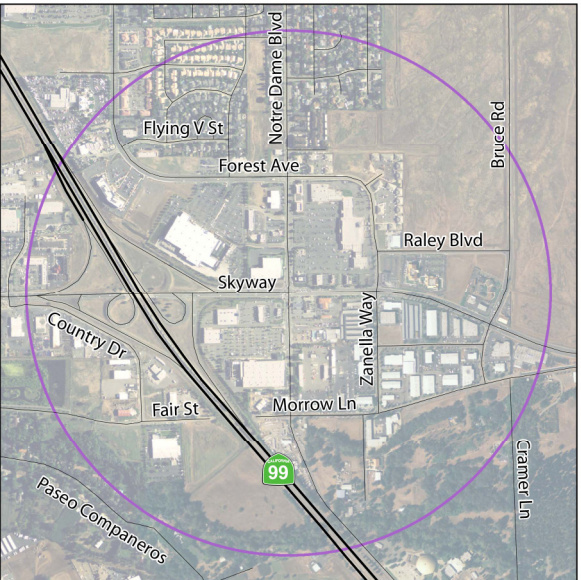
Neighborhood and Calculated Design Score	Map of Area Selected For Evaluation
<p>Very Low Density Residential Design Score = 4.00</p>	
<p>Low Density Residential Design Score = 4.09</p>	

Medium and Medium High Density Residential
Design Score = 4.30



High Density Residential / Downtown
Design Score = 4.59



<p>Office Design Score = 4.09</p>	
<p>Community Commercial / Commercial Services Design Score = 3.86</p>	

Manufacturing and Warehouse / Industrial Park
Design Score = 3.83

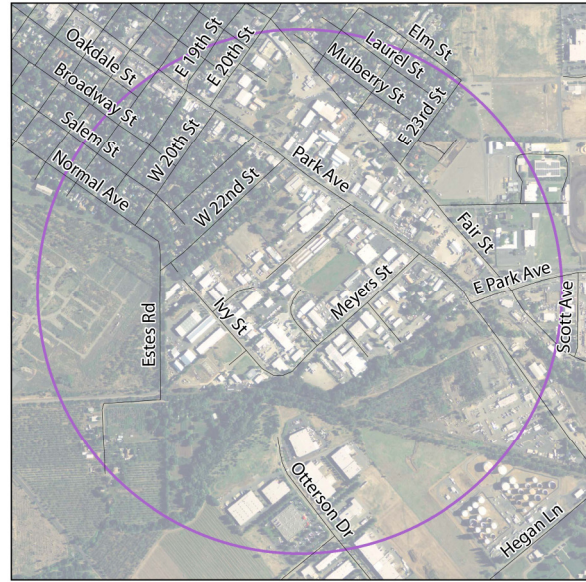


TABLE A3 - CHICO GENERAL PLAN LAND USE CATEGORIES AND DESIGN SCORES		
Chico Land Use Category	Description	Assigned Design Score
CC	Community Commercial (1994 General Plan Category Only)	3.86
CMU	Commercial Mixed Use	4.30
CMU DT	Commercial Mixed Use (Downtown)	4.59
CS	Commercial Services	3.86
D	Downtown	4.59
DRMU	Downtown Retail Mixed Use	4.59
DM	Diamond Match (1994 General Plan Category Only)	4.09
HDR	High Density Residential	4.59
IOMU	Industrial Office Mixed Use	3.83
IP/POS	Industrial Park / Primary Open Space (1994 General Plan Category Only)	4.09
LDR	Low Density Residential	4.09
LDR/POS	Low Density Residential / Primary Open Space	4.09
LW	Live Work	4.30
MDR	Medium Density Residential	4.30
MDR/POS	Medium Density Residential / Primary Open Space	4.30
MHDR	Medium/High Density Residential	4.30
MUNC	Mixed Use Neighborhood Core	4.59
MW	Manufacturing and Warehouse	3.83
MW/POS	Manufacturing and Warehouse / Primary Open Space	3.83
NC	Neighborhood Commercial	3.86
OFF	Office (1994 General Plan Category Only)	4.09
OMU	Office Mixed Use	4.30
OMU DT	Office Mixed Use (Downtown)	4.59
PFS	Public Facilities and Services	3.83
RC	Regional Commercial	3.86
RMU	Residential Mixed Use	4.30
RMU DT/TC	Residential Mixed Use (Downtown)	4.59
RMUH	Residential Mixed Use - High Density	4.59
SMU	Special Mixed Use	4.30
VLDR	Very Low Density Residential	4.09
VLDR/POS	Very Low Density Residential / Primary Open Space	4.09
POS	Primary Open Space	3.83
ROW	Right-of-way	3.83
SOS	Secondary Open Space	3.83

Preferred Land Use Alternative 4D Adjustments per TAZ

TAZ	Test_Scenario_INPUT			Base_Scenario_INPUT			Percent_Difference			4Ds_Adjustment_VT				
	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Total BEFORE Ceiling & Floor	Total AFTER Ceiling & Floor
23812	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23813	9798.487	0	0	825.1535	0	0	500.00%	0.00%	0.00%	-20.00%	0.00%	0.00%	0.80	0.80
23814	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23815	5466.43	0.166319	4.09	1631.326	0.377071	4.09	235.09%	-55.89%	0.00%	-9.40%	3.35%	0.00%	0.94	0.94
23816	2592.039	0.388222	4.09	2273.028	0.307793	4.09	14.03%	26.13%	0.00%	-0.56%	-1.57%	0.00%	0.98	0.98
23817	8821.457	0.736942	4.09	1546.053	0.765693	4.09	470.58%	-3.75%	0.00%	-18.82%	0.23%	0.00%	0.81	0.81
23818	11287.18	0.194599	4.0725	3024.776	0.206362	4.09	273.16%	-5.70%	-0.43%	-10.93%	0.34%	0.01%	0.89	0.89
23819	15068.98	0.738634	4.036	1418.155	0.973634	4.064	500.00%	-24.14%	-0.69%	-20.00%	1.45%	0.01%	0.81	0.81
25710	22600.36	0.756967	4.1161	20890.24	0.761078	4.1161	8.19%	-0.54%	0.00%	-0.33%	0.03%	0.00%	1.00	1.00
25711	22600.36	0.756967	4.1825	20890.24	0.761078	4.1825	8.19%	-0.54%	0.00%	-0.33%	0.03%	0.00%	1.00	1.00
26610	8560.895	0.403297	0	8346.329	0.398704	0	2.57%	1.15%	0.00%	-0.10%	-0.07%	0.00%	1.00	1.00
26612	16589.48	0.467643	4.2214	15751.25	0.444479	4.2214	5.32%	5.21%	0.00%	-0.21%	-0.31%	0.00%	0.99	0.99
26613	17390.02	0.633926	4.0883	16404.11	0.597316	4.0883	6.01%	6.13%	0.00%	-0.24%	-0.37%	0.00%	0.99	0.99
27410	7865.86	0.873056	4.09	7309.811	0.807003	4.09	7.61%	8.19%	0.00%	-0.30%	-0.49%	0.00%	0.99	0.99
27411	8642.897	0.52841	4.0956	8529.11	0.543546	4.0956	1.33%	-2.78%	0.00%	-0.05%	0.17%	0.00%	1.00	1.00
27810	3952.553	0	0	3972.84	0	0	-0.51%	0.00%	0.00%	0.02%	0.00%	0.00%	1.00	1.00
70011	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
70013	2344.485	0.024883	0	2141.982	0.0423	0	9.45%	-41.17%	0.00%	-0.38%	2.47%	0.00%	1.02	1.02
70014	11871.8	0.072774	4.08	11472.23	0.003953	3.86	3.48%	500.00%	5.70%	-0.14%	-30.00%	-0.11%	0.70	0.75
70015	13062.04	0.978138	3.9553	8781.636	0.267068	3.83	48.74%	266.25%	3.27%	-1.95%	-15.98%	-0.07%	0.82	0.82
100001							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100002							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100003							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100004							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100005							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100006							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100007							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100008							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100009							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100010							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00

Alternative A 4D Adjustments by TAZ

TAZ	Test_Scenario_INPUT			Base_Scenario_INPUT			Percent_Difference			4Ds_Adjustment_VT			Total BEFORE Ceiling & Floor	Total AFTER Ceiling & Floor
	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design		
2748	7935.229	0.908355	4.09	7309.811	0.807003	4.09	8.56%	12.56%	0.00%	-0.34%	-0.75%	0.00%	0.99	0.99
2749	6831.572	0.705071	0	8095.429	0.526069	0	-15.61%	34.03%	0.00%	0.62%	-2.04%	0.00%	0.99	0.99
2761	5386.882	0.588974	4.09	5180.429	0.494429	4.09	3.99%	19.12%	0.00%	-0.16%	-1.15%	0.00%	0.99	0.99
2762	13771.37	0.492556	4.0926	13385.37	0.439628	4.0926	2.88%	12.04%	0.00%	-0.12%	-0.72%	0.00%	0.99	0.99
2763	8694.053	0	4.09	8693.629	0	4.09	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2781	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2782	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2783	2730.883	0	0	2653.039	0	0	2.93%	0.00%	0.00%	-0.12%	0.00%	0.00%	1.00	1.00
2784	1336.09	0	0	1353.838	0	0	-1.31%	0.00%	0.00%	0.05%	0.00%	0.00%	1.00	1.00
2785	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2786	1046.384	0	0	1047.169	0	0	-0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2787	5023.922	0	0	4977.272	0	0	0.94%	0.00%	0.00%	-0.04%	0.00%	0.00%	1.00	1.00
2788	12055.7	0.204921	4.09	11877.36	0.201662	4.09	1.50%	1.62%	0.00%	-0.06%	-0.10%	0.00%	1.00	1.00
2789	4798.048	0	4.09	4793.851	0	4.09	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2801	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2802	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2803	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2804	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2821	10574.38	0.302069	4.09	825.1535	0	0	500.00%	0.00%	0.00%	-20.00%	0.00%	0.00%	0.80	0.80
2822	19433.21	0.878295	4.3367	7056.256	0.367413	0	175.40%	139.05%	0.00%	-7.02%	-8.34%	0.00%	0.85	0.85
2823	19422.54	0.66059	4.0733	3624.29	0.013601	0	435.90%	500.00%	0.00%	-17.44%	-30.00%	0.00%	0.58	0.75
2824	8966.746	0.803432	0	825.1535	0	0	500.00%	0.00%	0.00%	-20.00%	0.00%	0.00%	0.80	0.80
2841	522.7551	0.000573	0	141.4371	0.0028	0	269.60%	-79.53%	0.00%	-10.78%	4.77%	0.00%	0.93	0.93
2842	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2843	4518.2	0.018981	0	2742.997	0.0244	0	64.72%	-22.21%	0.00%	-2.59%	1.33%	0.00%	0.99	0.99
2861	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7002	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7003	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7004	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7005	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7006	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7007	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7008	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7009	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7012	10669.43	0.250542	0	9928.393	0.1622	0	7.46%	54.46%	0.00%	-0.30%	-3.27%	0.00%	0.96	0.96
7021	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7022	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7023	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7101	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7102	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7103	25.6	0	3.83	50.8879	0	3.83	-49.69%	0.00%	0.00%	1.99%	0.00%	0.00%	1.02	1.02
7104	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7121	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7122	2246.285	0.088269	3.924	768.6124	0.0258	0	192.25%	242.13%	0.00%	-7.69%	-14.53%	0.00%	0.79	0.79
7141	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7142	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7143	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7501	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7502	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7503	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7521	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7522	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7523	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7524	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7525	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7564	6639.076	0.694559	4.09	6618.474	0.691808	4.09	0.31%	0.40%	0.00%	-0.01%	-0.02%	0.00%	1.00	1.00
13010	14303.53	0.881967	4.1493	11653.61	0.863346	4.1493	22.74%	2.16%	0.00%	-0.91%	-0.13%	0.00%	0.99	0.99
13011	14591.41	0.781558	4.0825	12664.95	0.972767	4.0825	15.21%	-19.66%	0.00%	-0.61%	1.18%	0.00%	1.01	1.01
15010	5593.524	0.863295	0	4216.805	0.192185	0	32.65%	349.20%	0.00%	-1.31%	-20.95%	0.00%	0.78	0.78
20010	5881.066	0.152136	4.09	5413.599	0.175194	4.09	8.64%	-13.16%	0.00%	-0.35%	0.79%	0.00%	1.00	1.00
20810	2184.861	0	4.09	2281.182	0	4.0875	-4.22%	0.00%	0.06%	0.17%	0.00%	0.00%	1.00	1.00
20811	11322.37	0	4.0931	9973.958	0	4.0915	13.52%	0.00%	0.04%	-0.54%	0.00%	0.00%	0.99	0.99
20812	1942.244	0	0	1462.952	0	0	32.76%	0.00%	0.00%	-1.31%	0.00%	0.00%	0.99	0.99
23010	6771.931	0.294862	3.83	2130.955	0	4.09	217.79%	0.00%	-6.36%	-8.71%	0.00%	0.13%	0.91	0.91
23011	6421.182	0.412408	3.83	1694	0.55069	4.09	279.05%	-25.11%	-6.36%	-11.16%	1.51%	0.13%	0.90	0.90
23810	4447.98	0	0	4447.98	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23811	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00

Alternative A 4D Adjustments by TAZ

TAZ	Test_Scenario_INPUT			Base_Scenario_INPUT			Percent_Difference			4Ds_Adjustment_VT				
	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Total BEFORE Ceiling & Floor	Total AFTER Ceiling & Floor
23812	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23813	9248.232	0	0	825.1535	0	0	500.00%	0.00%	0.00%	-20.00%	0.00%	0.00%	0.80	0.80
23814	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23815	5201.498	0.17433	4.09	1631.326	0.377071	4.09	218.85%	-53.77%	0.00%	-8.75%	3.23%	0.00%	0.94	0.94
23816	2592.039	0.388221	4.09	2273.028	0.307793	4.09	14.03%	26.13%	0.00%	-0.56%	-1.57%	0.00%	0.98	0.98
23817	8140.822	0.652522	4.0964	1546.053	0.765693	4.09	426.56%	-14.78%	0.16%	-17.06%	0.89%	0.00%	0.84	0.84
23818	10335.51	0.346241	4.0744	3024.776	0.206362	4.09	241.70%	67.78%	-0.38%	-9.67%	-4.07%	0.01%	0.87	0.87
23819	14419.54	0.715462	4.0556	1418.155	0.973634	4.064	500.00%	-26.52%	-0.21%	-20.00%	1.59%	0.00%	0.81	0.81
25710	23400.35	0.755251	4.1161	20890.24	0.761078	4.1161	12.02%	-0.77%	0.00%	-0.48%	0.05%	0.00%	1.00	1.00
25711	23400.35	0.755251	4.1825	20890.24	0.761078	4.1825	12.02%	-0.77%	0.00%	-0.48%	0.05%	0.00%	1.00	1.00
26610	8430.71	0.393548	0	8346.329	0.398704	0	1.01%	-1.29%	0.00%	-0.04%	0.08%	0.00%	1.00	1.00
26612	17245.14	0.760694	4.1928	15751.25	0.444479	4.2214	9.48%	71.14%	-0.68%	-0.38%	-4.27%	0.01%	0.95	0.95
26613	18858.93	0.806143	4.1331	16404.11	0.597316	4.0883	14.96%	34.96%	1.10%	-0.60%	-2.10%	-0.02%	0.97	0.97
27410	7935.229	0.908355	4.09	7309.811	0.807003	4.09	8.56%	12.56%	0.00%	-0.34%	-0.75%	0.00%	0.99	0.99
27411	8782.891	0.620235	4.0956	8529.11	0.543546	4.0956	2.98%	14.11%	0.00%	-0.12%	-0.85%	0.00%	0.99	0.99
27810	3952.552	0	0	3972.84	0	0	-0.51%	0.00%	0.00%	0.02%	0.00%	0.00%	1.00	1.00
70011	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
70013	5471.353	0.03449	3.83	2141.982	0.0423	0	155.43%	-18.46%	0.00%	-6.22%	1.11%	0.00%	0.95	0.95
70014	11871.8	0.072774	4.08	11472.23	0.003953	3.86	3.48%	500.00%	5.70%	-0.14%	-30.00%	-0.11%	0.70	0.75
70015	12989.92	0.917404	3.9553	8781.636	0.267068	3.83	47.92%	243.51%	3.27%	-1.92%	-14.61%	-0.07%	0.84	0.84
100001							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100002							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100003							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100004							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100005							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100006							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100007							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100008							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100009							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100010							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00

Alternative C 4D Adjustments by TAZ

TAZ	Test_Scenario_INPUT			Base_Scenario_INPUT			Percent_Difference			4Ds_Adjustment_VT			Total BEFORE Ceiling & Floor	Total AFTER Ceiling & Floor
	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design		
2748	7470.082	0.762458	4.09	7309.811	0.807003	4.09	2.19%	-5.52%	0.00%	-0.09%	0.33%	0.00%	1.00	1.00
2749	6518.409	0.789787	0	8095.429	0.526069	0	-19.48%	50.13%	0.00%	0.78%	-3.01%	0.00%	0.98	0.98
2761	5320.66	0.527713	4.09	5180.429	0.494429	4.09	2.71%	6.73%	0.00%	-0.11%	-0.40%	0.00%	0.99	0.99
2762	13443.45	0.433065	4.0926	13385.37	0.439628	4.0926	0.43%	-1.49%	0.00%	-0.02%	0.09%	0.00%	1.00	1.00
2763	8694.053	0	4.09	8693.629	0	4.09	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2781	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2782	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2783	2730.883	0	0	2653.039	0	0	2.93%	0.00%	0.00%	-0.12%	0.00%	0.00%	1.00	1.00
2784	1336.09	0	0	1353.838	0	0	-1.31%	0.00%	0.00%	0.05%	0.00%	0.00%	1.00	1.00
2785	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2786	1046.384	0	0	1047.169	0	0	-0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2787	5023.922	0	0	4977.272	0	0	0.94%	0.00%	0.00%	-0.04%	0.00%	0.00%	1.00	1.00
2788	11891.63	0.204921	4.09	11877.36	0.201662	4.09	0.12%	1.62%	0.00%	0.00%	-0.10%	0.00%	1.00	1.00
2789	4798.048	0	4.09	4793.851	0	4.09	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2801	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2802	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2803	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2804	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2821	27350.06	0.835601	0	825.1535	0	0	500.00%	0.00%	0.00%	-20.00%	0.00%	0.00%	0.80	0.80
2822	19084	0.973357	0	7056.256	0.367413	0	170.46%	164.92%	0.00%	-6.82%	-9.90%	0.00%	0.84	0.84
2823	19301.42	0.675926	0	3624.29	0.013601	0	432.56%	500.00%	0.00%	-17.30%	-30.00%	0.00%	0.58	0.75
2824	12929.46	0.009111	0	825.1535	0	0	500.00%	0.00%	0.00%	-20.00%	0.00%	0.00%	0.80	0.80
2841	52.35616	0	0	141.4371	0.0028	0	-62.98%	-100.00%	0.00%	2.52%	6.00%	0.00%	1.09	1.09
2842	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
2843	5577.723	0.113762	0	2742.997	0.0244	0	103.34%	366.24%	0.00%	-4.13%	-21.97%	0.00%	0.75	0.75
2861	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7002	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7003	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7004	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7005	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7006	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7007	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7008	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7009	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7012	10898.03	0.197818	0	9928.393	0.1622	0	9.77%	21.96%	0.00%	-0.39%	-1.32%	0.00%	0.98	0.98
7021	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7022	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7023	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7101	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7102	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7103	25.6	0	3.83	50.8879	0	3.83	-49.69%	0.00%	0.00%	1.99%	0.00%	0.00%	1.02	1.02
7104	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7121	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7122	929.103	0.026626	0	768.6124	0.0258	0	20.88%	3.20%	0.00%	-0.84%	-0.19%	0.00%	0.99	0.99
7141	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7142	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7143	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7501	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7502	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7503	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7521	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7522	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7523	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7524	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7525	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
7564	6955.051	0.663346	4.09	6618.474	0.691808	4.09	5.09%	-4.11%	0.00%	-0.20%	0.25%	0.00%	1.00	1.00
13010	14303.53	0.881967	4.1493	11653.61	0.863346	4.1493	22.74%	2.16%	0.00%	-0.91%	-0.13%	0.00%	0.99	0.99
13011	14591.41	0.781558	4.0825	12664.95	0.972767	4.0825	15.21%	-19.66%	0.00%	-0.61%	1.18%	0.00%	1.01	1.01
15010	6232.795	0.134986	0	4216.805	0.192185	0	47.81%	-29.76%	0.00%	-1.91%	1.79%	0.00%	1.00	1.00
20010	5881.066	0.152136	4.09	5413.599	0.175194	4.09	8.64%	-13.16%	0.00%	-0.35%	0.79%	0.00%	1.00	1.00
20810	2184.861	0	4.09	2281.182	0	4.0875	-4.22%	0.00%	0.06%	0.17%	0.00%	0.00%	1.00	1.00
20811	11322.37	0	4.0931	9973.958	0	4.0915	13.52%	0.00%	0.04%	-0.54%	0.00%	0.00%	0.99	0.99
20812	1942.244	0	0	1462.952	0	0	32.76%	0.00%	0.00%	-1.31%	0.00%	0.00%	0.99	0.99
23010	6183.001	0.548981	3.83	2130.955	0	4.09	190.15%	0.00%	-6.36%	-7.61%	0.00%	0.13%	0.93	0.93
23011	5579.671	0.709007	3.83	1694	0.55069	4.09	229.38%	28.75%	-6.36%	-9.18%	-1.72%	0.13%	0.89	0.89
23810	4447.98	0	0	4447.98	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23811	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00

Alternative C 4D Adjustments by TAZ

TAZ	Test_Scenario_INPUT			Base_Scenario_INPUT			Percent_Difference			4Ds_Adjustment_VT				
	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Density	Diversity	Design	Total BEFORE Ceiling & Floor	Total AFTER Ceiling & Floor
23812	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23813	8356.534	0	0	825.1535	0	0	500.00%	0.00%	0.00%	-20.00%	0.00%	0.00%	0.80	0.80
23814	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
23815	5159.355	0.175676	4.09	1631.326	0.377071	4.09	216.27%	-53.41%	0.00%	-8.65%	3.20%	0.00%	0.94	0.94
23816	2592.039	0.388221	4.09	2273.028	0.307793	4.09	14.03%	26.13%	0.00%	-0.56%	-1.57%	0.00%	0.98	0.98
23817	7421.255	0.593186	4.09	1546.053	0.765693	4.09	380.01%	-22.53%	0.00%	-15.20%	1.35%	0.00%	0.86	0.86
23818	10763.52	0.211226	4.0744	3024.776	0.206362	4.09	255.85%	2.36%	-0.38%	-10.23%	-0.14%	0.01%	0.90	0.90
23819	13521.5	0.665588	4.0556	1418.155	0.973634	4.064	500.00%	-31.64%	-0.21%	-20.00%	1.90%	0.00%	0.82	0.82
25710	22397.34	0.778866	4.1161	20890.24	0.761078	4.1161	7.21%	2.34%	0.00%	-0.29%	-0.14%	0.00%	1.00	1.00
25711	22397.34	0.778866	4.1825	20890.24	0.761078	4.1825	7.21%	2.34%	0.00%	-0.29%	-0.14%	0.00%	1.00	1.00
26610	8381.877	0.395794	0	8346.329	0.398704	0	0.43%	-0.73%	0.00%	-0.02%	0.04%	0.00%	1.00	1.00
26612	16072.59	0.498013	4.1928	15751.25	0.444479	4.2214	2.04%	12.04%	-0.68%	-0.08%	-0.72%	0.01%	0.99	0.99
26613	16897.19	0.630691	4.066	16404.11	0.597316	4.0883	3.01%	5.59%	-0.55%	-0.12%	-0.34%	0.01%	1.00	1.00
27410	7470.082	0.762458	4.09	7309.811	0.807003	4.09	2.19%	-5.52%	0.00%	-0.09%	0.33%	0.00%	1.00	1.00
27411	8627.392	0.529203	4.0956	8529.11	0.543546	4.0956	1.15%	-2.64%	0.00%	-0.05%	0.16%	0.00%	1.00	1.00
27810	3952.552	0	0	3972.84	0	0	-0.51%	0.00%	0.00%	0.02%	0.00%	0.00%	1.00	1.00
70011	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
70013	2313.039	0.027561	0	2141.982	0.0423	0	7.99%	-34.84%	0.00%	-0.32%	2.09%	0.00%	1.02	1.02
70014	12216.09	0.004097	3.86	11472.23	0.003953	3.86	6.48%	3.64%	0.00%	-0.26%	-0.22%	0.00%	1.00	1.00
70015	13497.58	0.821137	3.838	8781.636	0.267068	3.83	53.70%	207.46%	0.21%	-2.15%	-12.45%	0.00%	0.86	0.86
100001							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100002							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100003							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100004							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100005							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100006							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100007							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100008							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100009							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00
100010							0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00	1.00