REVISED TECHNICAL TRAFFIC APPENDIX

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	656	376	60	712	154	415	315	71	139	188	87
Future Volume (veh/h)	57	656	376	60	712	154	415	315	71	139	188	87
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1881	1881	1863	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	57	656	177	60	712	81	415	315	46	139	188	82
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour 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
Percent Heavy Veh, %	1	2	1	1	2	1	1	1	1	1	1	1
Cap, veh/h	173	746	629	162	735	625	439	461	388	233	244	351
Arrive On Green	0.10	0.40	0.40	0.09	0.39	0.39	0.25	0.25	0.25	0.13	0.13	0.13
Sat Flow, veh/h	1792	1863	1571	1792	1863	1583	1792	1881	1583	1792	1881	1520
Grp Volume(v), veh/h	57	656	177	60	712	81	415	315	46	139	188	82
Grp Sat Flow(s),veh/h/ln	1792	1863	1571	1792	1863	1583	1792	1881	1583	1792	1881	1520
Q Serve(g_s), s	3.3	36.5	8.5	3.5	42.0	3.7	25.5	17.0	2.5	8.2	10.8	4.9
Cycle Q Clear(g_c), s	3.3	36.5	8.5	3.5	42.0	3.7	25.5	17.0	2.5	8.2	10.8	4.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	173	746	629	162	735	625	439	461	388	233	244	351
V/C Ratio(X)	0.33	0.88	0.28	0.37	0.97	0.13	0.94	0.68	0.12	0.60	0.77	0.23
Avail Cap(c_a), veh/h	208	746	629	208	739	628	439	461	388	320	336	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	31.1	22.7	48.0	33.2	21.6	41.6	38.4	32.9	46.0	47.2	35.5
Incr Delay (d2), s/veh	1.1	11.7	0.2	1.4	25.3	0.1	29.3	4.1	0.1	2.5	7.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	21.2	3.7	1.8	26.7	1.6	16.1	9.4	1.1	4.2	6.1	2.1
LnGrp Delay(d),s/veh	48.4	42.8	22.9	49.4	58.5	21.7	70.8	42.5	33.0	48.5	54.3	35.8
LnGrp LOS	D	D	C	D	E	C	E	D	C	D	D	D
Approach Vol, veh/h		890			853			776			409	
Approach Delay, s/veh		39.2			54.4			57.1			48.6	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.1	49.9		18.1	13.8	49.3		31.0
Change Period (Y+Rc), s	3.0	5.0		3.5	3.0	5.0		3.5
Max Green Setting (Gmax), s	13.0	44.5		20.0	13.0	44.5		27.5
Max Q Clear Time (g_c+I1), s	5.5	38.5		12.8	5.3	44.0		27.5
Green Ext Time (p_c), s	0.1	2.7		1.1	0.1	0.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.7
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	489	296	48	439	157	400	307	69	50	207	126
Future Volume (veh/h)	27	489	296	48	439	157	400	307	69	50	207	126
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1881	1881	1863	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	27	489	170	48	439	115	400	307	51	50	207	121
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour 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
Percent Heavy Veh, %	1	2	1	1	2	1	1	1	1	1	1	1
Cap, veh/h	129	570	482	186	629	527	457	479	403	284	298	358
Arrive On Green	0.07	0.31	0.31	0.10	0.34	0.34	0.25	0.25	0.25	0.16	0.16	0.16
Sat Flow, veh/h	1792	1863	1575	1792	1863	1561	1792	1881	1583	1792	1881	1535
Grp Volume(v), veh/h	27	489	170	48	439	115	400	307	51	50	207	121
Grp Sat Flow(s),veh/h/ln	1792	1863	1575	1792	1863	1561	1792	1881	1583	1792	1881	1535
Q Serve(g_s), s	1.2	20.9	7.1	2.1	17.3	4.5	18.1	12.3	2.1	2.0	8.8	5.6
Cycle Q Clear(g_c), s	1.2	20.9	7.1	2.1	17.3	4.5	18.1	12.3	2.1	2.0	8.8	5.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	129	570	482	186	629	527	457	479	403	284	298	358
V/C Ratio(X)	0.21	0.86	0.35	0.26	0.70	0.22	0.88	0.64	0.13	0.18	0.69	0.34
Avail Cap(c_a), veh/h	275	616	521	275	629	527	508	533	449	423	444	478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.0	27.7	22.9	34.9	24.3	20.1	30.3	28.1	24.3	30.8	33.7	27.2
Incr Delay (d2), s/veh	0.8	12.5	0.9	0.7	4.3	0.4	14.7	2.2	0.1	0.3	2.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	12.7	3.2	1.1	9.7	2.0	10.8	6.7	0.9	1.0	4.8	2.4
LnGrp Delay(d),s/veh	37.8	40.1	23.8	35.7	28.6	20.5	45.0	30.3	24.4	31.1	36.6	27.8
LnGrp LOS	D	D	C	D	C	C	D	C	C	C	D	C
Approach Vol, veh/h		686			602			758			378	
Approach Delay, s/veh		36.0			27.6			37.7			33.1	
Approach LOS		D			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.8	30.9		16.9	9.1	33.6		25.1
Change Period (Y+Rc), s	3.0	5.0		3.5	3.0	5.0		3.5
Max Green Setting (Gmax), s	13.0	28.0		20.0	13.0	28.0		24.0
Max Q Clear Time (g_c+I1), s	4.1	22.9		10.8	3.2	19.3		20.1
Green Ext Time (p_c), s	0.0	2.7		1.2	0.0	3.5		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	34.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	659	376	60	713	154	415	315	71	139	188	87
Future Volume (veh/h)	57	659	376	60	713	154	415	315	71	139	188	87
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1881	1881	1863	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	57	659	177	60	713	81	415	315	46	139	188	82
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour 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
Percent Heavy Veh, %	1	2	1	1	2	1	1	1	1	1	1	1
Cap, veh/h	172	747	630	162	736	625	439	461	388	233	244	351
Arrive On Green	0.10	0.40	0.40	0.09	0.40	0.40	0.25	0.25	0.25	0.13	0.13	0.13
Sat Flow, veh/h	1792	1863	1571	1792	1863	1583	1792	1881	1583	1792	1881	1520
Grp Volume(v), veh/h	57	659	177	60	713	81	415	315	46	139	188	82
Grp Sat Flow(s),veh/h/ln	1792	1863	1571	1792	1863	1583	1792	1881	1583	1792	1881	1520
Q Serve(g_s), s	3.3	36.8	8.5	3.5	42.1	3.7	25.5	17.0	2.5	8.2	10.8	4.9
Cycle Q Clear(g_c), s	3.3	36.8	8.5	3.5	42.1	3.7	25.5	17.0	2.5	8.2	10.8	4.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	172	747	630	162	736	625	439	461	388	233	244	351
V/C Ratio(X)	0.33	0.88	0.28	0.37	0.97	0.13	0.94	0.68	0.12	0.60	0.77	0.23
Avail Cap(c_a), veh/h	208	747	630	208	739	628	439	461	388	319	335	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	31.2	22.7	48.0	33.3	21.6	41.6	38.4	32.9	46.0	47.2	35.5
Incr Delay (d2), s/veh	1.1	12.0	0.2	1.4	25.5	0.1	29.4	4.1	0.1	2.5	7.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	21.4	3.7	1.8	26.8	1.6	16.1	9.4	1.1	4.2	6.1	2.1
LnGrp Delay(d),s/veh	48.4	43.2	22.9	49.4	58.8	21.7	71.0	42.5	33.0	48.5	54.4	35.8
LnGrp LOS	D	D	C	D	E	C	E	D	C	D	D	D
Approach Vol, veh/h		893			854			776			409	
Approach Delay, s/veh		39.5			54.6			57.2			48.7	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.1	50.0		18.1	13.8	49.3		31.0
Change Period (Y+Rc), s	3.0	5.0		3.5	3.0	5.0		3.5
Max Green Setting (Gmax), s	13.0	44.5		20.0	13.0	44.5		27.5
Max Q Clear Time (g_c+I1), s	5.5	38.8		12.8	5.3	44.1		27.5
Green Ext Time (p_c), s	0.1	2.6		1.1	0.1	0.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	492	296	48	441	157	400	307	69	50	207	126
Future Volume (veh/h)	27	492	296	48	441	157	400	307	69	50	207	126
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1881	1881	1863	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	27	492	170	48	441	115	400	307	51	50	207	121
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour 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
Percent Heavy Veh, %	1	2	1	1	2	1	1	1	1	1	1	1
Cap, veh/h	129	571	483	186	630	528	456	479	403	283	297	358
Arrive On Green	0.07	0.31	0.31	0.10	0.34	0.34	0.25	0.25	0.25	0.16	0.16	0.16
Sat Flow, veh/h	1792	1863	1576	1792	1863	1561	1792	1881	1583	1792	1881	1535
Grp Volume(v), veh/h	27	492	170	48	441	115	400	307	51	50	207	121
Grp Sat Flow(s),veh/h/ln	1792	1863	1576	1792	1863	1561	1792	1881	1583	1792	1881	1535
Q Serve(g_s), s	1.2	21.1	7.1	2.1	17.4	4.5	18.2	12.3	2.1	2.0	8.8	5.6
Cycle Q Clear(g_c), s	1.2	21.1	7.1	2.1	17.4	4.5	18.2	12.3	2.1	2.0	8.8	5.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	129	571	483	186	630	528	456	479	403	283	297	358
V/C Ratio(X)	0.21	0.86	0.35	0.26	0.70	0.22	0.88	0.64	0.13	0.18	0.70	0.34
Avail Cap(c_a), veh/h	275	615	520	275	630	528	507	532	448	423	444	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.1	27.7	22.9	35.0	24.3	20.0	30.3	28.1	24.3	30.9	33.8	27.3
Incr Delay (d2), s/veh	0.8	12.8	0.9	0.7	4.4	0.4	14.8	2.2	0.1	0.3	2.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	12.8	3.2	1.1	9.7	2.0	10.9	6.7	0.9	1.0	4.8	2.4
LnGrp Delay(d),s/veh	37.9	40.5	23.8	35.7	28.7	20.5	45.1	30.4	24.5	31.2	36.7	27.8
LnGrp LOS	D	D	C	D	C	C	D	C	C	C	D	C
Approach Vol, veh/h		689			604			758			378	
Approach Delay, s/veh		36.3			27.7			37.8			33.1	
Approach LOS		D			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.8	31.0		16.9	9.1	33.7		25.1
Change Period (Y+Rc), s	3.0	5.0		3.5	3.0	5.0		3.5
Max Green Setting (Gmax), s	13.0	28.0		20.0	13.0	28.0		24.0
Max Q Clear Time (g_c+I1), s	4.1	23.1		10.8	3.2	19.4		20.2
Green Ext Time (p_c), s	0.0	2.6		1.2	0.0	3.5		1.3

Intersection Summary	
HCM 2010 Ctrl Delay	34.1
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	23.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	107	215	24	32	241	30	73	45	77	45	12	79
Future Vol, veh/h	107	215	24	32	241	30	73	45	77	45	12	79
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	134	269	30	40	301	38	104	64	110	64	17	113
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	30.7	23.8	18.2	14.8
HCM LOS	D	C	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	37%	31%	11%	33%
Vol Thru, %	23%	62%	80%	9%
Vol Right, %	39%	7%	10%	58%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	195	346	303	136
LT Vol	73	107	32	45
Through Vol	45	215	241	12
RT Vol	77	24	30	79
Lane Flow Rate	279	432	379	194
Geometry Grp	1	1	1	1
Degree of Util (X)	0.543	0.796	0.699	0.388
Departure Headway (Hd)	7.011	6.625	6.641	7.19
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	513	549	542	497
Service Time	5.08	4.625	4.704	5.268
HCM Lane V/C Ratio	0.544	0.787	0.699	0.39
HCM Control Delay	18.2	30.7	23.8	14.8
HCM Lane LOS	C	D	C	B
HCM 95th-tile Q	3.2	7.6	5.5	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	456	290	36	453	148	367	287	46	112	182	33
Future Volume (veh/h)	23	456	290	36	453	148	367	287	46	112	182	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	1.00		0.98	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1881	1881	1863	1881	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	24	480	263	38	477	121	386	302	34	118	192	35
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	2	1	1	2	1	1	1	1	1	1	1
Cap, veh/h	118	587	498	149	619	513	469	492	410	299	256	47
Arrive On Green	0.07	0.32	0.32	0.08	0.33	0.33	0.26	0.26	0.26	0.17	0.17	0.17
Sat Flow, veh/h	1792	1863	1581	1792	1863	1544	1792	1881	1565	1792	1537	280
Grp Volume(v), veh/h	24	480	263	38	477	121	386	302	34	118	0	227
Grp Sat Flow(s),veh/h/ln	1792	1863	1581	1792	1863	1544	1792	1881	1565	1792	0	1817
Q Serve(g_s), s	1.1	20.6	11.8	1.7	19.9	4.9	17.5	12.2	1.4	5.1	0.0	10.3
Cycle Q Clear(g_c), s	1.1	20.6	11.8	1.7	19.9	4.9	17.5	12.2	1.4	5.1	0.0	10.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	118	587	498	149	619	513	469	492	410	299	0	303
V/C Ratio(X)	0.20	0.82	0.53	0.26	0.77	0.24	0.82	0.61	0.08	0.40	0.00	0.75
Avail Cap(c_a), veh/h	518	1098	932	518	1098	911	746	783	652	704	0	714
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.2	27.3	24.3	37.1	25.9	20.9	30.0	28.1	24.1	32.2	0.0	34.3
Incr Delay (d2), s/veh	0.8	2.9	0.9	0.9	2.1	0.2	4.1	1.2	0.1	0.8	0.0	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	11.0	5.2	0.9	10.6	2.1	9.2	6.5	0.6	2.6	0.0	5.5
LnGrp Delay(d),s/veh	39.1	30.2	25.2	38.0	28.0	21.1	34.2	29.3	24.2	33.0	0.0	38.0
LnGrp LOS	D	C	C	D	C	C	C	C	C	C		D
Approach Vol, veh/h		767			636			722			345	
Approach Delay, s/veh		28.8			27.3			31.7			36.3	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.2	32.3		17.9	8.7	33.7		26.1
Change Period (Y+Rc), s	3.0	5.0		3.5	3.0	5.0		3.5
Max Green Setting (Gmax), s	25.0	51.0		34.0	25.0	51.0		36.0
Max Q Clear Time (g_c+I1), s	13.7	22.6		12.3	3.1	21.9		19.5
Green Ext Time (p_c), s	0.1	4.5		1.7	0.0	3.9		3.0

Intersection Summary	
HCM 2010 Ctrl Delay	30.3
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	431	96	71	359	22	272	82	79	39	75	17
Future Volume (veh/h)	28	431	96	71	359	22	272	82	79	39	75	17
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.96	1.00		0.97	1.00		0.93
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1881	1881	1864	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	29	440	76	72	366	18	278	84	65	40	77	13
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	2	1	1	2	2	1	1	1	1	1	1
Cap, veh/h	108	562	477	263	682	34	353	191	148	289	250	42
Arrive On Green	0.06	0.30	0.30	0.15	0.39	0.39	0.20	0.20	0.20	0.16	0.16	0.16
Sat Flow, veh/h	1792	1863	1580	1792	1757	86	1792	970	750	1792	1551	262
Grp Volume(v), veh/h	29	440	76	72	0	384	278	0	149	40	0	90
Grp Sat Flow(s),veh/h/ln	1792	1863	1580	1792	0	1844	1792	0	1720	1792	0	1813
Q Serve(g_s), s	1.2	16.2	2.6	2.7	0.0	12.1	11.1	0.0	5.7	1.4	0.0	3.3
Cycle Q Clear(g_c), s	1.2	16.2	2.6	2.7	0.0	12.1	11.1	0.0	5.7	1.4	0.0	3.3
Prop In Lane	1.00		1.00	1.00		0.05	1.00		0.44	1.00		0.14
Lane Grp Cap(c), veh/h	108	562	477	263	0	716	353	0	339	289	0	292
V/C Ratio(X)	0.27	0.78	0.16	0.27	0.00	0.54	0.79	0.00	0.44	0.14	0.00	0.31
Avail Cap(c_a), veh/h	239	658	558	263	0	716	597	0	573	669	0	676
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.7	23.9	19.2	28.5	0.0	17.7	28.6	0.0	26.5	27.0	0.0	27.8
Incr Delay (d2), s/veh	1.3	6.9	0.3	0.6	0.0	1.5	3.9	0.0	0.9	0.2	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	9.4	1.2	1.4	0.0	6.4	5.9	0.0	2.8	0.7	0.0	1.7
LnGrp Delay(d),s/veh	35.0	30.8	19.5	29.0	0.0	19.2	32.5	0.0	27.4	27.2	0.0	28.4
LnGrp LOS	C	C	B	C		B	C		C	C		C
Approach Vol, veh/h		545			456			427			130	
Approach Delay, s/veh		29.5			20.7			30.7			28.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.3	14.0	27.2		15.6	7.5	33.6
Change Period (Y+Rc), s		3.5	3.0	4.5		3.5	3.0	4.5
Max Green Setting (Gmax), s		25.0	11.0	26.5		28.0	10.0	27.5
Max Q Clear Time (g_c+I1), s		13.1	4.7	18.2		5.3	3.2	14.1
Green Ext Time (p_c), s		1.4	0.1	3.3		0.6	0.0	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	27.1
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	31.7
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	420	52	15	400	149	0	2	55	0	2	66
Future Vol, veh/h	58	420	52	15	400	149	0	2	55	0	2	66
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.50	0.50	0.50	0.50	0.50
Heavy Vehicles, %	1	2	1	1	2	1	1	1	1	1	1	1
Mvmt Flow	64	467	58	17	444	166	0	4	110	0	4	132
Number of Lanes	0	1	0	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	1
HCM Control Delay	47.8	24.4	11.8	12.1
HCM LOS	E	C	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	11%	4%	0%	0%
Vol Thru, %	4%	79%	96%	0%	3%
Vol Right, %	96%	10%	0%	100%	97%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	57	530	415	149	68
LT Vol	0	58	15	0	0
Through Vol	2	420	400	0	2
RT Vol	55	52	0	149	66
Lane Flow Rate	114	589	461	166	136
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.216	0.946	0.801	0.255	0.255
Departure Headway (Hd)	6.83	5.783	6.256	5.542	6.737
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	524	630	581	651	532
Service Time	4.893	3.797	3.972	3.258	4.796
HCM Lane V/C Ratio	0.218	0.935	0.793	0.255	0.256
HCM Control Delay	11.8	47.8	29.5	10.1	12.1
HCM Lane LOS	B	E	D	B	B
HCM 95th-tile Q	0.8	12.9	7.8	1	1

Intersection	
Intersection Delay, s/veh	29.1
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	219	213	81	241	28	297	23	96	18	9	46
Future Vol, veh/h	28	219	213	81	241	28	297	23	96	18	9	46
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	1	2	1	1	1	1	1	2	1	1	1	1
Mvmt Flow	33	258	251	95	284	33	349	27	113	21	11	54
Number of Lanes	0	1	1	0	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	19.5	43.9	30	14.3
HCM LOS	C	E	D	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	11%	0%	23%	25%
Vol Thru, %	0%	19%	89%	0%	69%	12%
Vol Right, %	0%	81%	0%	100%	8%	63%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	297	119	247	213	350	73
LT Vol	297	0	28	0	81	18
Through Vol	0	23	219	0	241	9
RT Vol	0	96	0	213	28	46
Lane Flow Rate	349	140	291	251	412	86
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	0.8	0.279	0.622	0.483	0.872	0.213
Departure Headway (Hd)	8.244	7.165	7.708	6.946	7.622	8.94
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	437	500	468	516	474	404
Service Time	6.014	4.934	5.487	4.724	5.694	6.94
HCM Lane V/C Ratio	0.799	0.28	0.622	0.486	0.869	0.213
HCM Control Delay	36.9	12.7	22.5	16.1	43.9	14.3
HCM Lane LOS	E	B	C	C	E	B
HCM 95th-tile Q	7.2	1.1	4.1	2.6	9.2	0.8

Intersection	
Intersection Delay, s/veh	13.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	147	149	40	21	191	59	17	22	14	28	24	106
Future Vol, veh/h	147	149	40	21	191	59	17	22	14	28	24	106
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	184	186	50	26	239	74	21	28	18	35	30	133
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	16	13.2	10.1	11.2
HCM LOS	C	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	32%	44%	8%	18%
Vol Thru, %	42%	44%	70%	15%
Vol Right, %	26%	12%	22%	67%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	53	336	271	158
LT Vol	17	147	21	28
Through Vol	22	149	191	24
RT Vol	14	40	59	106
Lane Flow Rate	66	420	339	198
Geometry Grp	1	1	1	1
Degree of Util (X)	0.114	0.608	0.489	0.308
Departure Headway (Hd)	6.187	5.208	5.197	5.613
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	576	693	691	638
Service Time	4.257	3.25	3.242	3.67
HCM Lane V/C Ratio	0.115	0.606	0.491	0.31
HCM Control Delay	10.1	16	13.2	11.2
HCM Lane LOS	B	C	B	B
HCM 95th-tile Q	0.4	4.1	2.7	1.3

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West Napa Street/Bank of Marin Driveway
Study Scenario: Future plus Project - Weekday PM Peak Hour

Direction of Analysis Street: East/West
Cross Street Intersects: From the North

West Napa Street

Westbound Volumes (veh/hr)
Through Volume = 666
Right Turn Volume = 9

Westbound Speed Limit: 25 mph
Westbound Configuration: 2 Lanes - Undivided

Bank of Marin

West Napa Street

Eastbound Volumes (veh/hr)
708 = Through Volume
17 = Left Turn Volume

Eastbound Speed Limit: 25 mph
Eastbound Configuration: 2 Lanes - Undivided

Westbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	982.6
Advancing Volume	Va =	674.9995
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Westbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

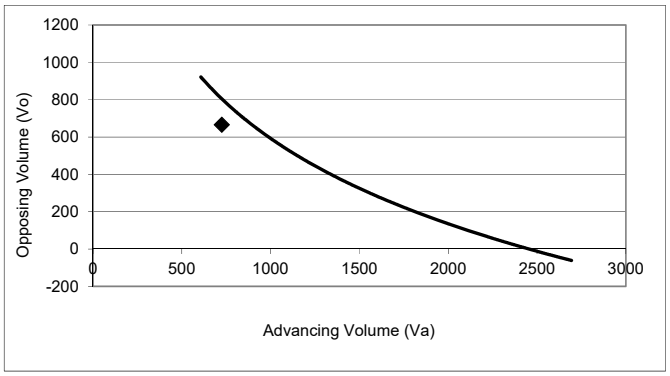
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	674.9995
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Eastbound Left Turn Lane Warrants

Percentage Left Turns	%lt	2.3 %
Advancing Volume Threshold	AV	892 veh/hr

If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 25 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements* , January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

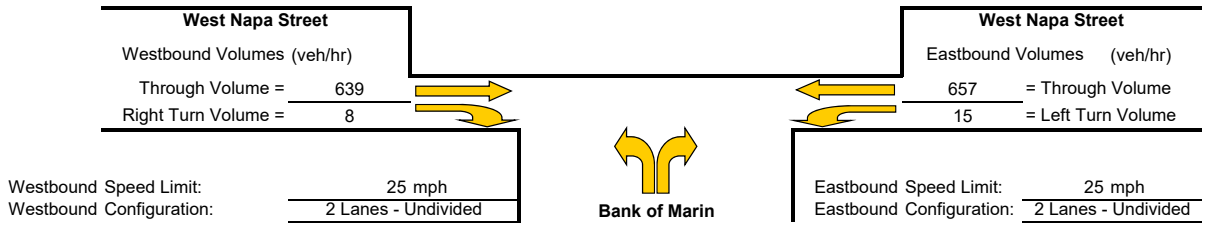
Estimate of Inbound Left Turns

	Outbound	Inbound	In from West	
Hotel (6 employees)		10	6	(60 percent)
Bank (2,754 sf)	18	15	10	(67 percent)
Office (3,246 sf)	4	1	1	(100 percent)
		26	17	

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West Napa Street/Bank of Marin Driveway
Study Scenario: Future plus Project - Weekend Midday Peak Hour

Direction of Analysis Street: East/West
Cross Street Intersects: From the North



Westbound Speed Limit: 25 mph
Westbound Configuration: 2 Lanes - Undivided

Eastbound Speed Limit: 25 mph
Eastbound Configuration: 2 Lanes - Undivided

Westbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	990.1
Advancing Volume	Va =	647
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Westbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

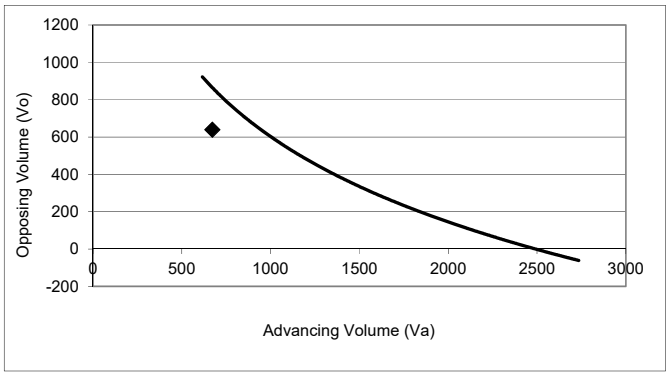
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	647
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Eastbound Left Turn Lane Warrants

Percentage Left Turns	%lt	2.2 %
Advancing Volume Threshold	AV	934 veh/hr

If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 25 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

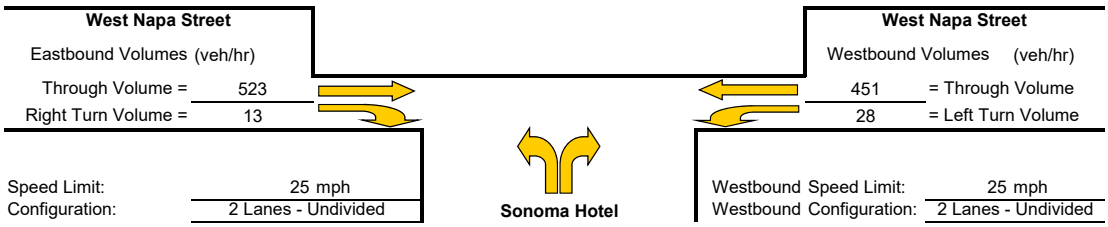
Estimate of Inbound Left Turns

	Outbound	Inbound	In from West	
Hotel (8 employees)		8	5	(60 percent)
Bank (2,754 sf)	18	15	10	(67 percent)
Office (3,246 sf)	1	0	0	
		23	15	

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West Napa Street/Sonoma Hotel Driveway
Study Scenario: Existing plus Project - Weekday PM Peak Hour

Direction of Analysis Street: East/West
Cross Street Intersects: From the South



Eastbound Speed Limit: 25 mph
Eastbound Configuration: 2 Lanes - Undivided

Westbound Speed Limit: 25 mph
Westbound Configuration: 2 Lanes - Undivided

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	952.6
Advancing Volume	Va =	535.9995
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

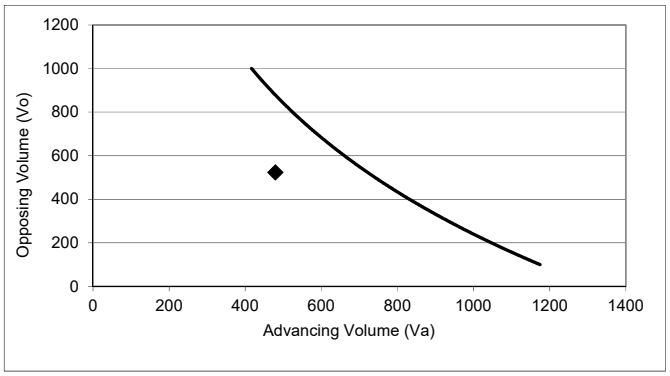
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	535.9995
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	5.8 %
Advancing Volume Threshold	AV	722 veh/hr

If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 25 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

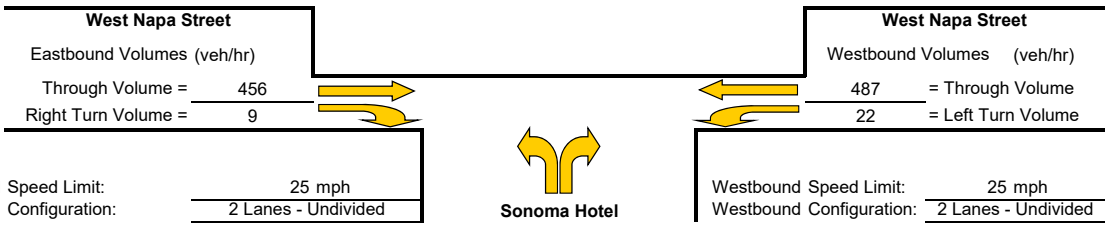
Estimate of Inbound Left Turns

	Outbound	Inbound	In from East	
Hotel	18	19	13	(70 percent)
Apartments (7)	1	3	2	(67 percent)
Retail (479 sf)	0	1	1	(67 percent)
Bank (2,756 sf)	18	15	10	(67 percent)
Office (12,665 sf)	16	3	2	(67 percent)
		41	28	

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West Napa Street/Sonoma Hotel Driveway
Study Scenario: Existing plus Project - Weekend Midday Peak Hour

Direction of Analysis Street: East/West
Cross Street Intersects: From the South



Eastbound Speed Limit: 25 mph
Eastbound Configuration: 2 Lanes - Undivided

Westbound Speed Limit: 25 mph
Westbound Configuration: 2 Lanes - Undivided

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	982.6
Advancing Volume	Va =	465
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

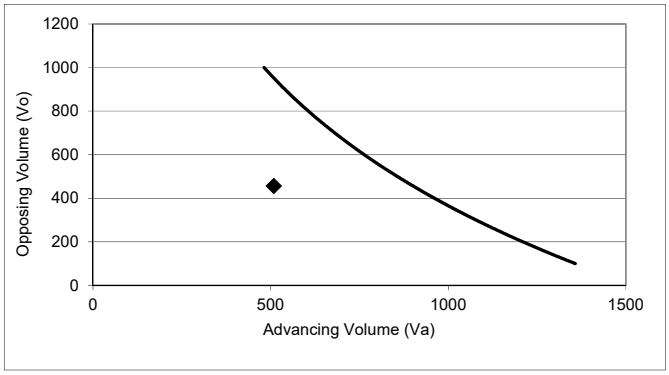
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	465
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	4.3 %
Advancing Volume Threshold	AV	901 veh/hr

If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 25 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements* , January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

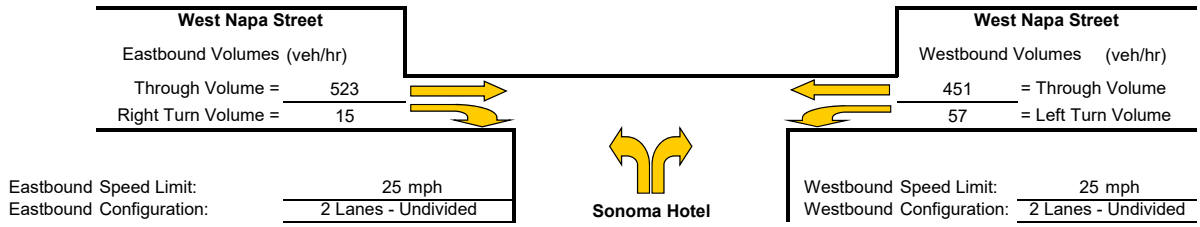
Estimate of Inbound Left Turns

	Outbound	Inbound	In from East	
Hotel	20	25	18	(70 percent)
Apartments (7)	2	2	1	(67 percent)
Retail (479 sf)	1	1	1	
Bank (2,756 sf)			0	Closed on Saturday
Office (12,665 sf)	5	3	2	(67 percent)
		31	22	

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West Napa Street/Sonoma Hotel Driveway
Study Scenario: Existing plus MAX - Weekday PM Peak Hour Threshold

Direction of Analysis Street: East/West
Cross Street Intersects: From the South



Eastbound Speed Limit: 25 mph
Eastbound Configuration: 2 Lanes - Undivided

Westbound Speed Limit: 25 mph
Westbound Configuration: 2 Lanes - Undivided

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	937.6
Advancing Volume	Va =	537.9995
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

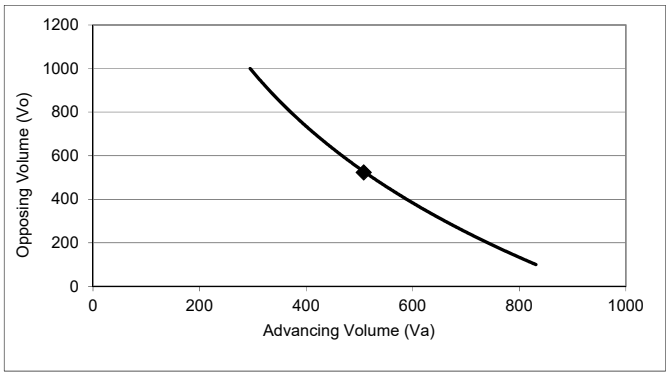
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	537.9995
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	11.2 %
Advancing Volume Threshold	AV	511 veh/hr

If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 25 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West Napa Street/Sonoma Hotel Driveway
Study Scenario: Existing plus MAX - Weekend Midday Peak Hour Threshold

Direction of Analysis Street: East/West
Cross Street Intersects: From the South

West Napa Street

Eastbound Volumes (veh/hr)
Through Volume = 456
Right Turn Volume = 12

Eastbound Speed Limit: 25 mph
Eastbound Configuration: 2 Lanes - Undivided

Sonoma Hotel

West Napa Street

Westbound Volumes (veh/hr)
487 = Through Volume
62 = Left Turn Volume

Westbound Speed Limit: 25 mph
Westbound Configuration: 2 Lanes - Undivided

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	960.1
Advancing Volume	Va =	468
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

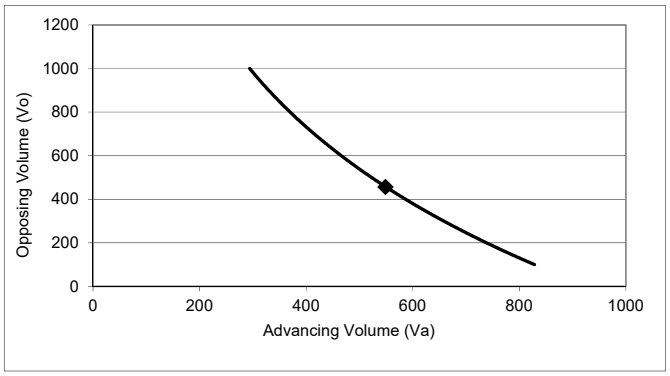
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	468
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	11.3 %
Advancing Volume Threshold	AV	550 veh/hr

If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 25 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

FEHR PEERS

MEMORANDUM

Date: October 17, 2016

To: Bill Hooper

From: Ella Carney

Subject: Sonoma Hotel Parking Analysis

SF16-0898

This memorandum details an assessment of the expected parking demand generated by the proposed Sonoma Hotel development project ("Proposed Project") using the Urban Land Institute (ULI) Shared Parking Model. It then compares this projection to City of Sonoma Municipal Code requirements and the Proposed Project parking supply.

Using the most recent Project Description, the ULI Shared Parking Model predicts that the Proposed Project will generate a parking demand that meets or slightly exceed the proposed 115 spaces from April through October from approximately 9 AM until mid-afternoon. This demand peaks at 120 spaces at 2 PM on a weekday in September. This demand projection would exceed the proposed supply of 115 spaces by five spaces.

PROJECT DESCRIPTION

The Proposed Project would feature a hotel in downtown Sonoma on the south side of West Napa Street between 1st Street West and 2nd Street West. The proposed hotel would include 62 guest rooms, an 80-seat restaurant, two small meeting rooms, and a spa. The Proposed Project would provide 115 parking spaces on site as shown in **Figure 1**.

In addition to the Proposed Project land uses, the 115 on-site parking spaces would also accommodate the parking for two adjacent existing land uses; office space (including a bank) and seven apartments located at 135 West Napa Street and office space at 117 West Napa Street. The Proposed Project and adjacent land uses are detailed in **Table 1**.

TABLE 1: PROPOSED LAND USES	
Land Use	**Size**
Proposed Project	
Hotel Rooms	62 rooms
Restaurant	80 seats 7,168 square feet
Meeting Rooms[1]	2 rooms
Spa[2]	4,857 square feet
Parking	115 parking spaces
Adjacent Land Uses	
Bank	2,093 square feet
Office	14,399 square feet[3]
Residential Apartments	5 studio 2 one-bedroom 4,360 square feet

Notes:
1. Meeting rooms would be for use by hotel guests only, as they would be designed for small group meetings, rather than large banquets or events.
2. The spa would have six treatment rooms, a small workout facility, and a pool. Hotel guests would be the primary customers.
3. Leasable square feet; 5,514 square feet in 135 West Napa Street and 8,885 square feet in 117 West Napa Street.

Figure 1

Proposed Project Site Plan

Source: RossDrulisCusenbery Architecture, Inc., 2016

PARKING DEMAND AND REQUIREMENTS

This section discusses the Proposed Project and adjacent land use-generated parking demand that would utilize the Proposed Project's on-site parking supply. Parking demand projections are calculated using the ULI Shared Parking model. This section also calculates the Proposed Project parking requirements per the City of Sonoma Municipal Code.

ULI Shared Parking

The following analysis calculates parking demand utilizing factors developed by ULI and found in its publication *Shared Parking, Second Edition* (2005), as allowed by the Sonoma Municipal Code. ULI recommends calibration of their model to local conditions, if possible.

Parking Model Assumptions

The following assumptions were incorporated into the Shared Parking Model to reflect local conditions.

Land Use Categories: The model differentiates between parking rates for business and leisure use at a hotel. Because the clients staying at the Proposed Project would primarily be visiting for leisure, the model assumes that 75 percent of the hotel room use will be for leisure and 25 percent will be for business. The two meeting rooms included as part of the Proposed Project are small and expected to only be used for hotel guests; there will not be external events planned in these spaces, and they will not generate any parking demand on their own. Therefore they are not included in the demand calculation.

Noncaptive Ratio: ULI defines the noncaptive ratio as "the percentage of visitors to a component of a project who are new customers to the overall project." This analysis assumes the following noncaptive ratio for the spa and restaurant uses:

- **Spa**: The Spa customers are expected to be almost exclusively hotel guests; this analysis assumes a noncaptive ratio of five percent, meaning that five percent of all spa users will be coming to the site only to visit the spa. Conversely, 95 percent of spa visitors are expected to be hotel guests.
- **Restaurant**: The restaruant is expected to have substantial local draw during dinner hours in addition to serving hotel guests; this analysis assumes a noncaptive ratio of 75 percent in the evenings and on the weekend, meaning that three quarters of all restaurant

customers during these periods will be coming to the site only to visit the restaurant. Conversely, 25 percent of restaurant customers are expected to be hotel guests. Because the restaurant is expected to have modest local draw during lunch on the weekdays, the weekday daytime noncaptive ratio is 50 percent, meaning that half of the restaurnt guests are visiting the site only for the restaurant and half are expected to be hotel guests.

For the remaining uses, this analysis assumes a noncaptive ratio of 100 percent, meaning that people visiting the adjacent residential and commercial land uses are not also visiting a second land use on the site.

Parking Rates: The ULI Shared Parking model includes recommended parking ratios and monthly and hourly factors with the recommendation that local data replace standard rates where available. This analysis assumes the following adjustments to parking rates to better reflect the Proposed Project:

- **Hotel:** Some of the hotel administrative staff would be located off-site; the maximum number of employees on-site at any time would be on the weekend and would not exceed 20 employees. Assuming 20 employees and the mode of travel (84 percent drive-alone and five percent carpool) for the Census tract containing the Proposed Project,[1] the weekend on-site rate was increased to 0.28 employees per room. Additionally, based on travel patterns at other similar hotels in Sonoma, the parking rate per room for leisure travelers is expected to be significantly lower during the week; the visitor parking rate during the weekday was reduced to 0.8 spaces per room (compared to 1.0 spaces per room on the weekend) to reflect this pattern.
- **Restaurant:** The ULI model rate is based on square feet; however, the number of seats is a more accurate method to predict parking demand. This analysis has been revised to calculate parking demand for the restaurant based on number of seats; it assumes the parking demand rate from the Institute of Transportation Engineers *Parking Generation*, 4th Edition (2010) for a Quality Restaurant of approximately one parking space for every two seats.[2]
- **Health Club:** The ULI model assumes the standard parking demand associated with a fitness center that is focused on exercise equipment rather than a spa facility, as proposed at the Proposed Project. While the Proposed Project will include fitness equipment, they would be exclusively for the use of hotel guests while the spa treatments

[1] American Community Survey, 2010-2014.
[2] The ITE rate for a Quality Restaurant (ITE Land Use Code 931) on a Friday, which is the highest demand during the week, is on average 0.49 spaces per seat. The 85th percentile is 0.61 spaces per seat, and the maximum observed rate is 1.0 space per seat. This analysis assumes the average rate.

could be for the general public in addition to hotel guests. As a result, the model default settings provided a customer rate that is too high for the intended use. Therefore, the parking rates have been ajdusted to assume that the six treatment rooms would result in the demand for eight customer parking spaces. The 20 hotel employees detailed above include the spa employees.

- **Office:** The ULI model assumes an employee rate of 3.5 spaces per 1,000 square feet. All of the existing and proposed office spaces are under lease. The terms specify a total of 47 parking spaces, which equals a rate of 3.26 spaces per 1,000 square feet. The office rates have been updated to reflect this site-specific data; the model also includes the standard guest rate of 0.3 spaces per ksf beyond what is provied in the leases.
- **Residential:** The ULI model assumes a mix of sizes of residential units. The adjacent site has five studio and two one-bedroom units, and the leases for these units provide one space per unit. This analysis assumes a parking rate of one space per unit plus guest parking demand beyond what is provided in the leases.

Peaking Factors: A series of time-of-day, day-of-week, and month-by-month peaking factors are applied to base parking rates to calculate hourly parking demand by weekday/weekend for each month of the year. These factors have been calibrated to reflect the peak tourist season in August and September for the hotel, restaurant, and health club in Sonoma.[3] Due to its unique characteristics compared to other weekdays, ULI considers Friday evening as part of the weekend.

Shared Parking Demand

The ULI model projected parking demand as follows:

- September would be the peak month of the year
- Weekday peak period would be at 2 PM; weekend peak period would be at 12 PM
- The peak parking demand would be higher on the weekday than on the weekend.

The peak weekday and weekend parking demand are detailed in **Table 2** and **Chart 1** (on-site uses are shown in green and off-site uses are shown in gray). Below this, a chart of parking demand for the peak month is shown, and analysis calculations are included in **Appendix A**. The peak parking demand for the Proposed Project and the adjacent land uses whose parking will be accommodated on site is 120 spaces; this peak would occur at 2PM on a weekday in September.

[3] The seasonal demand for the hotel use was calibrated using the *Market Demand and Financial Analysis: Proposed Chateau Sonoma Hotel* prepared for Kenwood Investments by PKF Consulting (July 20, 2012).

TABLE 2: ULI SHARED PARKING DEMAND

Land Use	Amount	Parking Demand (spaces)	
		Weekday, 2PM	Weekend, 12PM
Hotel	62 rooms	51	54
Restaurant	80 seats	6	26
Spa	4,857 square feet	0[1]	0[1]
Apartments	5 studio, 2 1-bedroom apartments	5[2]	5
Bank	2,093 square feet	7[3]	8[3]
Office	14,399 square feet	51	5
	Total	**120**	**98**

Notes:

1. The spa employees are included under the hotel employee category, and nearly all guests to the spa are expected to also be hotel guests.

2. The ULI model assumes that 70% of peak demand is occurring at 2 PM on a weekday.

3. The ULI model assumes a lower demand in the middle of the day during the week (50% for customers) and peak demand in the middle of the day on the weekend (90% for customers).

Source: Urban Land Institute Shared Parking Model (2005)

CHART 1: PEAK PARKING DEMAND

Weekday, 2 PM, September

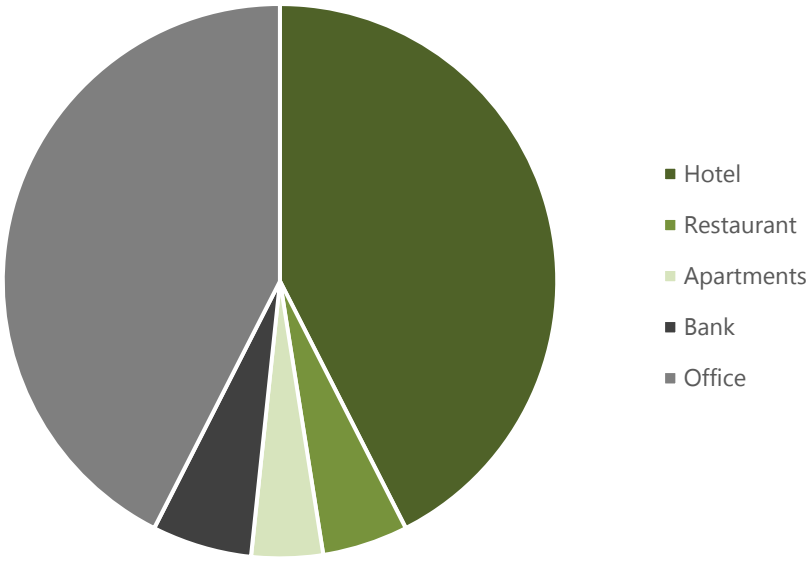
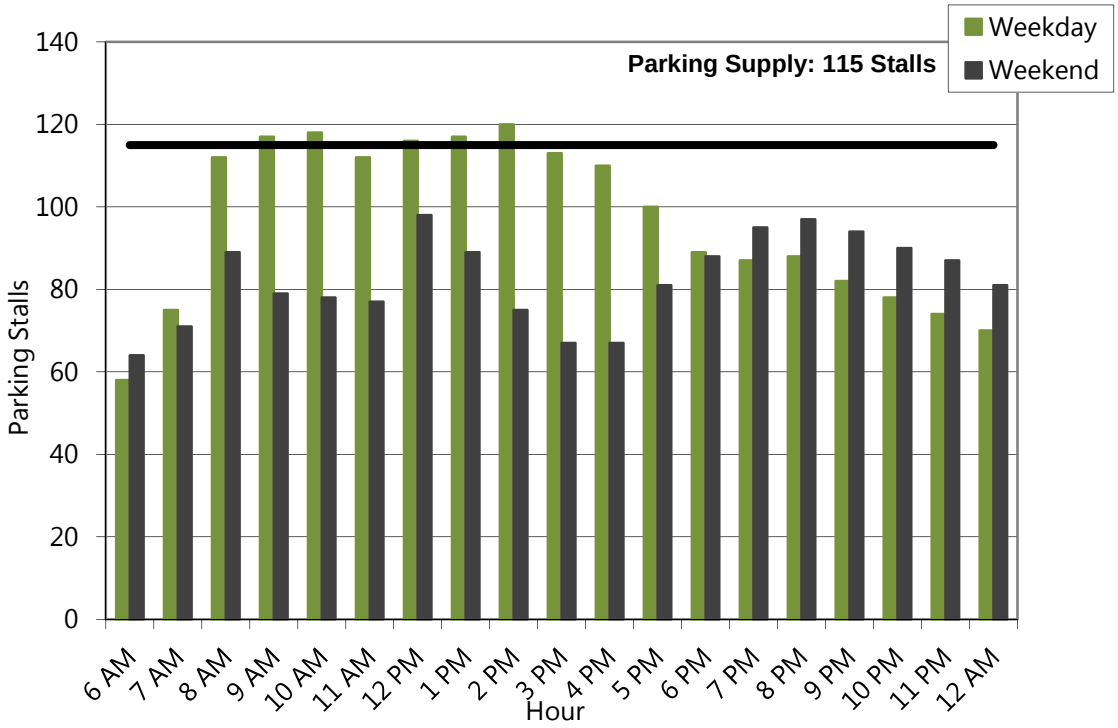


CHART 2: PEAK MONTH DAILY PARKING DEMAND BY HOUR



City of Sonoma Municipal Code Requirements

The City of Sonoma Municipal Code lists the number of required parking spaces for a development. The City lists requirements for developments with a single land use, which are summarized in **Table 3**. Chapter 19.48.050 section B specifies that adjacent nonresidential uses with distinct and differing peak parking use may have a reduction in required parking spaces up to the amount of spaces required for the least intensive of the uses sharing the parking. The Proposed Project land use with the least intensive non-residential parking demand would be the Spa. Chapter 19.48.050 Section A also specifies that for mixed uses, parking requirements "may be reduced upon determination by the planning commission" if justified by an independent parking demand study such as the shared parking analysis detailed in this memorandum. Finally, section 19.48.050A.2 specifies that the parking required for a second use within a single building may be reduced by up to one half of the required parking.

TABLE 3: PARKING REQUIREMENTS – SINGLE LAND USE

Land Use	Parking Regulations	Required Parking	
		Individual Uses	Shared Uses
Proposed Project Land Uses			
Hotel (62 rooms, peak of 20 on-site employees)	One space for each guest room, plus one space for each two employees on the largest shift, plus required spaces for accessory uses.	72	72
Restaurant (80 seats)	One space for each four seats. For outdoor seating, no off-street parking shall be required for up to 25% of the approved number of indoor seats.[1]	10[1]	10[1]
Spa (4,857 square feet)	One space for each 300 sq. ft. of gross floor area.	16	0
	On-Site Total	**98**	**82**
Adjacent Land Uses			
Apartments (5 studio, 2 1-bedroom)	One and one-half space for each unit with one space for each unit covered, plus guest parking at the rate of 25% of total required spaces.	13	13
Office (including bank) (16,492 square feet)	One space for each 300 sq. ft. of gross floor area.	55	55
	Off-Site Total	**68**	**68**
	Grand Total	**166**	**150**

Notes:
1. Section 19.48.050A.2 specifies that the parking required for a second use within a single building may be reduced by up to one half of the required parking. The rate listed here is therefore half of the restaurant rate, or one space for every eight seats.
Source: City of Sonoma Municipal Code, Table 4-4, 2016.

Without any shared parking reduction, the Proposed Project would require a minimum of 98 spaces. The least intensive demand for the Proposed Project is the 16 spaces required for the Spa. Reducing the requirement by these 16 spaces results in 82 required spaces for the Proposed Project.

The adjacent land uses would require a minimum of 68 spaces. The shared parking reduction would not apply to these land uses.

SUMMARY OF PARKING ANALYSIS

The City of Sonoma Municipal Code parking requirements generally represent the maximum parking that would be expected by each use during peak season and allow for the reduction of the requirements when justified by a parking analysis. The ULI Shared Parking model takes into account the distinct and different peak demand of various land uses, and it also has been calibrated to reflect local conditions.

The typical requirements and the estimated parking demand according to the ULI Shared Parking Model are summarized in **Table 4**. The peak estimated parking demand according to the ULI Shared Parking model occurs at 2 PM on a weekday in September and reaches 120 parking spaces, which exceeds the proposed parking supply of 115 spaces by five spaces. Parking demand is expected to be equal to or greater than 115 spaces from approximately 9 AM until mid-afternoon during the weekday from April through October. Parking demand is less than approximately 98 spaces on the weekend even during peak season.

TABLE 4: EXPECTED PARKING DEMAND VS PROPOSED SUPPLY

Land Use	Amount	Parking Demand/Supply (spaces)	
		ULI Shared Parking Demand[1]	Municipal Code Supply
Hotel	62 rooms	51	72
Restaurant	80 seats	6	10
Spa	4,857 square feet	0	0[2]
Apartments	5 studio, 2 1-bedroom apartments	5	13
Bank	2,093 square feet	7	7
Office	14,399 square feet	51	48
	Total	**120**	**150**
Parking Demand and Proposed Supply			
Proposed Project Parking Supply		115	
	Parking Supply Deficit	**5**	**35**

Notes:

1. Weekday peak demand.
2. This value includes the reduction permitted for shared parking as detailed in the Municipal Code.

Source: Urban Land Institute Shared Parking Model, Institute of Transportation Engineers *Parking Generation*, 4th Edition (2010), City of Sonoma Municipal Code, Table 4-4, 2016.

Attachments:

Appendix A: ULI Shared Parking Model

Table 10/13/2016
Project: **Sonoma Hotel**
Description: **Plus Project**

SHARED PARKING DEMAND SUMMARY

PEAK MONTH: SEPTEMBER -- PEAK PERIOD: 2 PM, WEEKDAY

Projected Parking Supply:	**115 Stalls**		**Weekday**					**Weekend**					**Weekday**			**Weekend**		
	Project Data		**Base**	**Mode**	**Non-Captive**	**Project**		**Base**	**Mode**	**Non-Captive**	**Project**		**Peak Hr Adj**	**Peak Mo Adj**	**Estimated Parking**	**Peak Hr Adj**	**Peak Mo Adj**	**Estimated Parking**
Land Use	**Quantity**	**Unit**	**Rate**	**Adj**	**Ratio**	**Rate**	**Unit**	**Rate**	**Adj**	**Ratio**	**Rate**	**Unit**	**2 PM**	**September**	**Demand**	**12 PM**	**September**	**Demand**
Health Spa	4,857	sf GLA	1.66	1.00	0.05	0.08	/ksf GLA	1.66	1.00	0.05	0.08	/ksf GLA	0.70	1.00	0	0.50	1.00	0
Employee			0.00	1.00	1.00	0.00	/ksf GLA	0.00	1.00	1.00	0.00	/ksf GLA	0.75	1.00	0	0.50	1.00	0
Hotel-Business	16	rooms	1.00	1.00	1.00	1.00	/rooms	0.90	1.00	1.00	0.90	/rooms	0.60	0.93	9	0.55	0.93	7
Hotel-Leisure	46	rooms	0.80	1.00	1.00	0.80	/rooms	1.00	1.00	1.00	1.00	/rooms	0.70	1.00	26	0.65	1.00	30
Restaurant/Lounge	80	seats	0.49	1.00	0.50	0.25	/seat	0.49	1.00	0.75	0.37	/seat	0.33	1.00	6	0.90	1.00	26
Employee			0.25	1.00	1.00	0.25	/rooms	0.28	1.00	1.00	0.28	/rooms	1.00	1.00	16	1.00	1.00	17
Residential, Rental, Shared Spaces	7	units	1.00	1.00	1.00	1.00	/unit	1.00	1.00	1.00	1.00	/unit	0.70	1.00	5	0.65	1.00	5
Reserved		sp/unit	0	1.00	1.00	0	/unit	0	1.00	1.00	0	/unit	1.00	1.00	0	1.00	1.00	0
Guest	7	units	0.15	1.00	1.00	0.15	/unit	0	1.00	1.00	0	/unit	0.20	1.00	0	0.20	1.00	0
Office <25 ksf	14,399	sf GLA	0.30	1.00	1.00	0.30	/ksf GLA	0.03	1.00	1.00	0.03	/unit	1.00	1.00	4	0.90	1.00	0
Employee			3.26	1.00	1.00	3.26	/ksf GLA	0.35	1.00	1.00	0.35	/unit	1.00	1.00	47	0.90	1.00	5
Bank (Branch) with Drive-In	2,093	sf GLA	3.00	1.00	1.00	3.00	/ksf GLA	3.00	1.00	1.00	3.00	/ksf GLA	0.70	1.00	4	0.90	1.00	5
Employee			1.60	1.00	1.00	1.60	/ksf GLA	1.60	1.00	1.00	1.60	/ksf GLA	1.00	1.00	3	1.00	1.00	3
														Customer	49		Customer	68
														Employee	71		Employee	30
														Reserved	0		Reserved	0
														Total	120		Total	98
														Shared Parking Reduction	35%			33%

ULI base data have been modified from default values.

ksf = thousand square feet

Projected Parking Supply:	115	Stalls			Mode Adjustment				Noncaptive Ratio			
			Max Parking Spaces		Weekday		Weekend		Weekday		Weekend	
Land Use	**Quantity**		**Weekday**	**Weekend**	**Daytime**	**Evening**	**Daytime**	**Evening**	**Daytime**	**Evening**	**Daytime**	**Evening**
Health Spa	4,857	sf GLA	8	8	100%	100%	100%	100%	5%	5%	5%	5%
Employee			0	0	100%	100%	100%	100%	100%	100%	100%	100%
Hotel-Business	16	rooms	16	14	100%	100%	100%	100%	100%	100%	100%	100%
Hotel-Leisure	46	rooms	37	46	100%	100%	100%	100%	100%	100%	100%	100%
Restaurant/Lounge	80	sf GLA	39	39	100%	100%	100%	100%	50%	75%	75%	75%
Conference Ctr/Banquet (20 to 50 sq ft/guest room)		sf GLA	0	0	100%	100%	100%	100%	100%	100%	100%	100%
Convention Space (>50 sq ft/guest room)		sf GLA	0	0	100%	100%	100%	100%	100%	100%	100%	100%
Employee			16	17	100%	100%	100%	100%	100%	100%	100%	100%
Residential, Rental, Shared Spaces	7	units	7	7	100%	100%	100%	100%	100%	100%	100%	100%
Reserved	0	sp/unit	0	0	100%	100%	100%	100%	100%	100%	100%	100%
Guest	7	units	1	1	100%	100%	100%	100%	100%	100%	100%	100%
Office <25 ksf	14,399	sf GLA	4	0	100%	100%	100%	100%	100%	100%	100%	100%
Employee			47	5	100%	100%	100%	100%	100%	100%	100%	100%
Bank (Branch) with Drive-In	2,093	sf GLA	6	6	100%	100%	100%	100%	100%	100%	100%	100%
Employee			3	3	100%	100%	100%	100%	100%	100%	100%	100%
Subtotal Customer/Guest Spaces			111	114								
Subtotal Employee/Resident Spaces			73	32								
Subtotal Reserved Spaces			0	0								
Total Parking Spaces			184	146								

Recommended Parking Ratios					
Spaces required per unit land use					
Land Use	Weekday		Weekend		Unit
	Visitor	Employee	Visitor	Employee	
Community Shopping Center (<400 ksf)	2.90	0.70	3.20	0.80	/ksf GLA
Regional Shopping Center (400 to 600 ksf)	Linear 2.9<x<3.2				/ksf GLA
Super Regional Shopping Center (>600 ksf)	3.20	0.80	3.60	0.90	/ksf GLA
Fine/Casual Dining Restaurant	15.25	2.75	17.00	3.00	/ksf GLA
Family Restaurant	9.00	1.50	12.75	2.25	/ksf GLA
Fast Food Restaurant	12.75	2.25	12.00	2.00	/ksf GLA
Nightclub	15.25	1.25	17.50	1.50	/ksf GLA
Cineplex	0.19	0.01	0.26	0.01	/seat
Performing Arts Theater	0.30	0.07	0.33	0.07	/seat
Arena	0.27	0.03	0.30	0.03	/seat
Pro Football Stadium	0.30	0.01	0.30	0.01	/seat
Pro Baseball Stadium	0.31	0.01	0.34	0.01	/seat
Health Spa	1.66	0.00	1.66	0.00	/ksf GLA
Convention Center	5.50	0.50	5.50	0.50	/ksf GLA
Hotel-Business	1.00	0.25	0.90	0.28	/room
Hotel-Leisure	0.80	0.25	1.00	0.28	/room
Restaurant/Lounge	0.49		0.49		/seat
Conference Ctr/Banquet (20 to 50 sq ft/guest room)	30.00		30.00		/ksf GLA
Convention Space (>50 sq ft/guest room)	20.00		10.00		/ksf GLA
Residential, Rental, Shared Spaces *	0.15	1.00	0.15	1.00	/unit
Residential, Owned, Shared Spaces *	0.15	1.70	0.15	1.70	/unit
Office <25 ksf	0.30	3.26	0.03	0.35	/unit
Office 25 to 100 ksf	Linear 0.3<x<0.25				/ksf GLA
Office 100 to 500 ksf	Linear 0.25<x<0.2				/ksf GLA
Office >500 ksf	0.20	2.60	0.02	0.26	/ksf GLA
Data Processing Office	0.25	5.75	0.03	0.58	/ksf GLA
Medical/Dental Office	3.00	1.50	3.00	1.50	/ksf GLA
Bank (Branch) with Drive-In	3.00	1.60	3.00	1.60	/ksf GLA

* 1.0 space reserved for residents' sole use; remainder may be shared.

Employees:	Pct	Peak count, weekend days
Total	100%	20
Drive alone:	84%	16.8
Carpool (assumed AVO=2)	5%	0.5
Total Vehicles		17.3
Rate per room:		0.279

Memorandum

Date: October 21, 2016

Project: SON049

To: Mr. David Goodison
City of Sonoma

From: Zack Matley
zmatley@w-trans.com

Subject: Sonoma Hotel Parking Analysis Peer Review

As requested, W-Trans has completed a focused peer review of the Sonoma Hotel Parking Analysis memorandum, prepared by Fehr & Peers and dated October 17, 2016. The primary purpose of our review is to assess whether the applied Shared Parking assessment, which uses the Shared Parking methodology developed by the Urban Land Institute (ULI), applies logical assumptions and produces results that provide a reasonable estimate of the project's potential parking demand. In order to complete our review expeditiously, we have used a bulleted list format in this memorandum.

Review of the Applied Assumptions and Rates by Land Use

- Hotel: It is unclear why a mix of leisure and business hotel types were assumed. Given the nature of the project and its context, it should be classified solely as a leisure hotel. The analysis lowers the base parking demand rate for weekday visitors from ULI's default of 0.90/room to a revised rate of 0.80/room, while retaining the ULI weekend rate of 1.0/room. This appears to be reasonable, though Staff should confirm the assumption that weekday demand for hotel rooms in Sonoma is indeed typically 20 percent lower than on weekends. The adjustments applied for employee parking are reasonable.

- Meeting Rooms: Excluding meeting rooms of the proposed size from hotel parking demand is consistent with the ULI methodology.

- Spa: The ULI model does not include a Spa land use. As a result the analysis uses the "Health Club" land use hourly parking demand characteristics, and adjusts the rates to reflect up to eight guests in the six treatment rooms, which is an acceptable approach. The assumption that only five percent of spa guests would be from outside the hotel, however, needs further justification. We believe a more reasonable assumption would be a 50 percent noncaptive ratio for spa guests.

- Restaurant: The ULI methodology uses restaurant square footage to determine restaurant demand within hotels. For the proposed 7,168 square foot restaurant, the ULI methodology produces a base parking demand (before deductions) of 72 spaces. The applied analysis instead uses an ITE peak parking demand rate based on the number of seats, producing a base parking demand of 39 spaces. Because the proposed project appears to have an unusually large floor space for 80 seats, this is an acceptable substitution, though the City may wish to confirm that the 80-seat cap is a realistic long-range assumption. The applied noncaptive rates are reasonable given the site's context.

- Office: The fact that current office lease terms cap the number of onsite parking spaces that may be used does not necessarily mean that the actual demand is reduced; some office tenants or guests may simply park offsite on surrounding streets. The default ULI model peak parking demand rate of 3.5 spaces per thousand square feet of office space should be maintained.

- Residential: The default ITE base parking demand for an apartment is 1.5 spaces per unit for residents plus 0.15 spaces per unit for guests. The analysis reduces the resident parking demand to 1.0 space per unit given

the overall small unit sizes (five studios and two one-bedroom units). This is a reasonable assumption given the unit sizes and surrounding context. Note that it is unclear as to whether the residential spaces are reserved, or shared with adjacent uses as part of the overall shared parking "pool." If the spaces are reserved, they must be accounted for separately in the analysis and a slightly higher total parking demand will result.

- Bank: The analysis uses default ULI rates for a bank, which is acceptable.

Review of Peaking and Mode Adjustment Factors

- The adjusted seasonal peaking factors applied in the analysis are appropriate given local tourism trends.

- The analysis does not apply mode adjustment factors, which are intended to account for reduced parking demand associated due to travel by walking, bicycling, and transit. While Sonoma does not have robust transit service, journey-to-work data (as summarized in the recent Circulation Element Existing Conditions Report) shows that walking and bicycling in Sonoma have a higher mode share than surrounding areas – approximately 11 percent in contrast to approximately 3 percent countywide. As a result, it would be appropriate to apply a 90% adjustment factor (reflecting 90% travel by car) to the office and bank land uses.

- The ULI methodology indicates that full-service hotels can have mode adjustment factors of 66% to 77%, though such adjustments may be contingent on the availability of transit, shuttle, and taxi services typical of those found in a major city. A small town like Sonoma has fewer non-auto options, though tourism-related influences such as occupancy of the hotel by small group guided tours (which typically include transportation) and occupancy of multiple rooms by guests arriving in one vehicle would still affect mode share. We believe a modest mode share adjustment of 90% is appropriate for the hotel component of the project.

Summary of Recommended Adjustments

- Classify all hotel rooms as a leisure hotel
- Apply a 50% noncaptive ratio for spa uses
- Maintain the default ULI demand for office uses (base rate of 3.5 spaces per thousand square feet)
- Apply a 90% mode adjustment factor to office and bank land uses
- Apply a 90% mode adjustment factor to the hotel

Resulting Shared Parking Demand

With the recommended modifications, the ULI shared parking model projects a peak shared parking demand to occur on weekdays at 1:00 PM. The peak parking demand on weekdays is projected to be 122 spaces, which is two greater than the 120 spaces projected in the applicant's analysis. On weekends the peak parking demand of 95 spaces (three fewer spaces than the applicant's analysis) is projected to occur at noon.

As noted above, if the residential units have reserved parking spaces, fewer spaces will be available for the shared parking pool and a slightly higher peak parking demand of 124 spaces is projected to occur. In fact, a similar effect could be expected with any use of reserved spaces, regardless of the use.

Depending on whether the residential spaces are reserved, the adjusted analysis results in an estimated parking project deficit of seven to nine spaces during the peak parking demand period.

Thank you for giving W-Trans the opportunity to provide these services. Please let us know if you have any questions.

JZM/SON049.M1
Attachments: Updated ULI Shared Parking Model with Recommended Adjustments

Table
W-Trans Peer Review of Sonoma Hotel with Recommended Adjustments

10/19/2016

SHARED PARKING DEMAND SUMMARY

PEAK MONTH: SEPTEMBER -- PEAK PERIOD: 1 PM, WEEKDAY

			Weekday					Weekend					Weekday			Weekend		
	Project Data		Base	Mode	Non-Captive	Project		Base	Mode	Non-Captive	Project		Peak Hr Adj	Peak Mo Adj	Estimated Parking	Peak Hr Adj	Peak Mo Adj	Estimated Parking
Land Use	Quantity	Unit	Rate	Adj	Ratio	Rate	Unit	Rate	Adj	Ratio	Rate	Unit	1 PM	September	Demand	12 PM	September	Demand
Spa	4,857	sf GLA	1.66	1.00	0.50	0.83	/ksf GLA	1.66	1.00	0.50	0.83	/ksf GLA	0.70	1.00	3	0.50	1.00	2
Employee			0.00	1.00	1.00	0.00	/ksf GLA	0.00	1.00	1.00	0.00	/ksf GLA	0.75	1.10	0	0.50	1.10	0
Hotel-Leisure	62	rooms	0.80	0.90	1.00	0.72	/rooms	1.00	0.90	1.00	0.90	/rooms	0.65	1.00	29	0.65	1.00	36
Restaurant/Lounge	80	seats	0.49	1.00	0.50	0.25	/ksf GLA	0.49	1.00	0.75	0.37	/ksf GLA	1.00	1.00	20	1.00	1.00	29
Employee			0.25	1.00	1.00	0.25	/rooms	0.18	1.00	1.00	0.18	/rooms	1.00	1.00	16	1.00	1.00	11
Residential, Rental, Shared Spaces	7	units	1.00	1.00	1.00	1.00	/unit	1.00	1.00	1.00	1.00	/unit	0.70	1.00	5	0.65	1.00	5
Reserved		sp/unit	0	1.00	1.00	0	/unit	0	1.00	1.00	0	/unit	1.00	1.00	0	1.00	1.00	0
Guest	7	units	0	1.00	1.00	0	/unit	0	1.00	1.00	0	/unit	0.20	1.00	0	0.20	1.00	0
Office <25 ksf	14,399	sf GLA	0.30	0.90	1.00	0.27	/unit	0.03	0.90	1.00	0.03	/unit	0.45	1.00	2	0.90	1.00	0
Employee			3.50	0.90	1.00	3.15	/unit	0.35	0.90	1.00	0.32	/unit	0.90	1.00	41	0.90	1.00	4
Bank (Branch) with Drive-In	2,093	sf GLA	3.00	0.90	1.00	2.70	/ksf GLA	3.00	0.90	1.00	2.70	/ksf GLA	0.50	1.00	3	0.90	1.00	5
Employee			1.60	0.90	1.00	1.44	/ksf GLA	1.60	0.90	1.00	1.44	/ksf GLA	1.00	1.00	3	1.00	1.00	3
													Customer		57	Customer		72
													Employee		65	Employee		23
													Reserved		0	Reserved		0
													Total		122	Total		95

ULI base data have been modified from default values.

W-Trans Peer Review of Sonoma Hotel with Recommended Adjustments

ksf = thousand square feet

Projected Parking Supply: 115					Mode Adjustment				Noncaptive Ratio			
			Max Parking Spaces		Weekday		Weekend		Weekday		Weekend	
Land Use	**Quantity**		**Weekday**	**Weekend**	**Daytime**	**Evening**	**Daytime**	**Evening**	**Daytime**	**Evening**	**Daytime**	**Evening**
Spa	4,857	sf GLA	8	8	100%	100%	100%	100%	50%	50%	50%	50%
Employee			0	0	100%	100%	100%	100%	100%	100%	100%	100%
Hotel-Leisure	62	rooms	50	62	**90%**	**90%**	**90%**	**90%**	100%	100%	100%	100%
Restaurant/Lounge	80	seats	39	39	100%	100%	100%	100%	50%	75%	75%	75%
Conference Ctr/Banquet (20 to 50 sq ft/guest room)		sf GLA	0	0	100%	100%	100%	100%	100%	100%	100%	100%
Convention Space (>50 sq ft/guest room)		sf GLA	0	0	100%	100%	100%	100%	100%	100%	100%	100%
Employee			16	11	100%	100%	100%	100%	100%	100%	100%	100%
Residential, Rental, Shared Spaces	7	units	7	7	100%	100%	100%	100%	100%	100%	100%	100%
Reserved		sp/unit	0	0	100%	100%	100%	100%	100%	100%	100%	100%
Guest	7	units	1	1	100%	100%	100%	100%	100%	100%	100%	100%
Office <25 ksf	14,399	sf GLA	4	0	**90%**	**90%**	**90%**	**90%**	100%	100%	100%	100%
Employee			50	5	**90%**	**90%**	**90%**	**90%**	100%	100%	100%	100%
Bank (Branch) with Drive-In	2,093	sf GLA	6	6	**90%**	**90%**	**90%**	**90%**	100%	100%	100%	100%
Employee			3	3	**90%**	**90%**	**90%**	**90%**	100%	100%	100%	100%
Subtotal Customer/Guest Spaces			108	116								
Subtotal Employee/Resident Spaces			76	26								
Subtotal Reserved Spaces			0	0								
Total Parking Spaces			184	142								

Recommended Parking Ratios					
Spaces required per unit land use					
Land Use	Weekday		Weekend		Unit
	Visitor	Employee	Visitor	Employee	
Community Shopping Center (<400 ksf)	2.90	0.70	3.20	0.80	/ksf GLA
Regional Shopping Center (400 to 600 ksf)	Linear 2.9<x<3.2				/ksf GLA
Super Regional Shopping Center (>600 ksf)	3.20	0.80	3.60	0.90	/ksf GLA
Fine/Casual Dining Restaurant	15.25	2.75	17.00	3.00	/ksf GLA
Family Restaurant	9.00	1.50	12.75	2.25	/ksf GLA
Fast Food Restaurant	12.75	2.25	12.00	2.00	/ksf GLA
Nightclub	15.25	1.25	17.50	1.50	/ksf GLA
Cineplex	0.19	0.01	0.26	0.01	/seat
Performing Arts Theater	0.30	0.07	0.33	0.07	/seat
Arena	0.27	0.03	0.30	0.03	/seat
Pro Football Stadium	0.30	0.01	0.30	0.01	/seat
Pro Baseball Stadium	0.31	0.01	0.34	0.01	/seat
Spa	1.66	0.00	1.66	0.00	/ksf GLA
Convention Center	5.50	0.50	5.50	0.50	/ksf GLA
Hotel-Business	1.00	0.25	0.90	0.18	/room
Hotel-Leisure	0.80	0.25	1.00	0.28	/room
Restaurant/Lounge	0.49		0.49		/seat
Conference Ctr/Banquet (20 to 50 sq ft/guest room)	30.00		30.00		/ksf GLA
Convention Space (>50 sq ft/guest room)	20.00		10.00		/ksf GLA
Residential, Rental, Shared Spaces *	0.15	1.00	0.15	1.00	/unit
Residential, Owned, Shared Spaces *	0.15	1.7	0.15	1.7	/unit
Office <25 ksf	0.30	3.5	0.03	0.35	/unit
Office 25 to 100 ksf	Linear 0.3<x<0.25				/ksf GLA
Office 100 to 500 ksf	Linear 0.25<x<0.2				/ksf GLA
Office >500 ksf	0.20	2.60	0.02	0.26	/ksf GLA
Data Processing Office	0.25	5.75	0.03	0.58	/ksf GLA
Medical/Dental Office	3.00	1.50	3.00	1.50	/ksf GLA
Bank (Branch) with Drive-In	3.00	1.60	3.00	1.60	/ksf GLA

Kenwood Investments, LLC

Hotel Project Sonoma
Parking Management Plan

Parking Facilities

The Hotel Project Sonoma has two parking entrances including the main entrance on West Napa Street and a gate-controlled side entrance on First Street West. The hotel parking facilities are designed to accommodate hotel guests, employees and the tenants of the Lynch and Sonoma Index-Tribune (SIT) buildings. Parking easements will be recorded in favor of these buildings on the hotel parking lot. Each property will have ingress and egress easements allowing them to cross the respective properties for access to the parking lots. A mix of valet and self-parking will be employed at the facility to maximize efficiency and convenience for all parties.

The project parking will be accommodated in four areas. The main lot is located in the underground garage where 94 spaces are available. A second lot with 9 spaces that will be used for valet parking is located on the street level on First Street West. This parking lot also serves as a delivery dock during morning delivery hours. The hotel will not accept large truck deliveries after 10am. A third lot with 12 spaces is located at the guest arrival area and adjacent to the Lynch Building just off of the West Napa Street driveway entrance. A fourth lot containing 25 spaces for overflow parking will be available directly across the street from the hotel main entrance at 136 West Napa Street.

Operations

By using a valet parking strategy at the hotel, the number of parking spaces can go beyond the striped capacity through the common practice of having valets stack the cars in designated valet spaces. When combined with the striped spaces, the valet stacking program will provide parking for up to 115 cars on the hotel property.

All hotel guests will be offered valet parking service on a 24/7 basis. During off peak times, patrons will be allowed the option to self-park. At peak times, all guests, including those visiting the SIT and Lynch Buildings (bank excluded), will be required to valet park. The valet process is straight forward. Signage on the main drive adjacent to the hotel's front door will direct entering vehicles to stop for assistance. A uniformed valet attendant will approach the driver of each vehicle and ascertain the nature, type and duration of their stay. The valet will request the guest's name and issue a multi-part claim check with sequential numbers for security and accounting purposes. The clam check also allows valets to easily determine the location of parked vehicles for a speedy return for guest departures. The valet will park

and lock the car and mark the location of the vehicle on the claim check. Customer keys will be locked in a secure area near the valet station and the front entry.

According to the project parking study conducted in October 2016 by Fehr & Peers, the hotel lots will provide most of the needed parking for the hotel and neighboring Lynch and SIT buildings. The study points out that during peak parking hours on weekdays during August and September, the hotel parking facilities could be five (5) spaces short of accommodating the peak parking demand. In order to accommodate peak parking, the hotel has arranged an agreement to park cars across the street in the overflow lot at 136 West Napa Street. During those peak days when hotel and building occupancy is high, the hotel will instruct employees to park in the overflow lot.

Tenant and Employee Parking

Parking for customers of Umpqua Bank will continue to use dedicated parking spaces located adjacent to the Lynch Building entrance. These spaces will be available for valet parking during non-banking hours.

Hotel employees and building tenants will self-park and can be directed to enter through the First Street West entrance with a security gate key. While designated areas will be available for their use, there will be no assigned spaces. On peak days, hotel employees will be directed to the overflow parking spaces at 136 West Napa Street located directly across the street from the hotel's main entrance. This lot has up to 25 spaces available for employee parking. Employees will self-park and cross the street using the cross walk located at West Napa Street and First Street West. Company work rules will make using the cross walk a requirement when using the overflow lot.

Deliveries

Hotel deliveries will be done through the First Street West parking lot and entrance in order to drop off at the basement level receiving area. Large trucks will be required to use the loading docs in the upper parking lot. A freight elevator is available to facilitate the deliveries from the upper lot. Smaller vans or trucks can drive and deliver directly to the basement area. Large vehicle deliveries will be required to deliver before 10am.