

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	620	70	148	438	420	70	514	206	240	205	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1830		1770	1863	1538	1770	1767		1770	1735	
Flt Permitted	0.10	1.00		0.11	1.00	1.00	0.36	1.00		0.09	1.00	
Satd. Flow (perm)	183	1830		199	1863	1538	676	1767		161	1735	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	379	646	73	154	456	438	73	535	215	250	214	179
RTOR Reduction (vph)	0	3	0	0	0	149	0	10	0	0	20	0
Lane Group Flow (vph)	379	716	0	154	456	289	73	740	0	250	373	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	68.5	50.9		50.0	37.4	37.4	47.3	41.3		59.3	48.3	
Effective Green, g (s)	68.5	50.9		50.0	37.4	37.4	47.3	41.3		59.3	48.3	
Actuated g/C Ratio	0.50	0.37		0.36	0.27	0.27	0.34	0.30		0.43	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	391	675		215	505	417	279	529		221	608	
v/s Ratio Prot	c0.18	c0.39		0.07	0.24		0.01	c0.42		c0.11	0.21	
v/s Ratio Perm	0.30			0.19		0.19	0.08			0.38		
v/c Ratio	0.97	1.06		0.72	0.90	0.69	0.26	1.40		1.13	0.61	
Uniform Delay, d1	42.6	43.5		35.0	48.4	45.1	31.7	48.3		41.1	37.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	36.8	52.1		9.1	19.3	5.0	0.2	190.9		100.4	1.8	
Delay (s)	79.4	95.5		44.1	67.8	50.0	31.8	239.1		141.5	38.9	
Level of Service	E	F		D	E	D	C	F		F	D	
Approach Delay (s)		90.0			56.9			220.7			78.8	
Approach LOS		F			E			F			E	
Intersection Summary												
HCM 2000 Control Delay	108.2			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.20											
Actuated Cycle Length (s)	137.8			Sum of lost time (s)					20.0			
Intersection Capacity Utilization	114.8%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	169	417	170	70	483	210	220	571	80	100	475	203
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
Hourly flow rate (vph)	178	439	179	74	508	221	232	601	84	105	500	214
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total (vph)	796	803	232	685	105	714						
Volume Left (vph)	178	74	232	0	105	0						
Volume Right (vph)	179	221	0	84	0	214						
Hadj (s)	-0.06	-0.11	0.53	-0.05	0.53	-0.18						
Departure Headway (s)	9.4	9.3	10.2	9.6	10.2	9.5						
Degree Utilization, x	2.08	2.09	0.65	1.82	0.30	1.87						
Capacity (veh/h)	389	392	347	381	351	386						
Control Delay (s)	515.2	518.0	29.2	401.8	16.2	424.0						
Approach Delay (s)	515.2	518.0	307.7		371.5							
Approach LOS	F	F	F		F							
Intersection Summary												
Delay			423.6									
Level of Service			F									
Intersection Capacity Utilization			139.0%	ICU Level of Service		H						
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	837	0	50	0	0	0	60	1114	0	0	891	613
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.95					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1765					1770	3539			3539	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1765					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	872	0	52	0	0	0	62	1160	0	0	928	639
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	0	339
Lane Group Flow (vph)	0	875	0	0	0	0	62	1160	0	0	928	300
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		31.2					7.0	61.7			49.7	49.7
Effective Green, g (s)		31.2					7.0	61.7			49.7	49.7
Actuated g/C Ratio		0.29					0.07	0.58			0.47	0.47
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		520					116	2061			1660	742
v/s Ratio Prot							0.04	c0.33			0.26	
v/s Ratio Perm		0.50										0.19
v/c Ratio		1.68					0.53	0.56			0.56	0.40
Uniform Delay, d1		37.4					47.9	13.7			20.2	18.4
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		315.2					2.4	0.6			0.7	0.8
Delay (s)		352.5					50.2	14.3			20.9	19.2
Level of Service		F					D	B			C	B
Approach Delay (s)		352.5			0.0			16.1			20.2	
Approach LOS		F			A			B			C	
Intersection Summary												
HCM 2000 Control Delay		101.6					HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		105.9					Sum of lost time (s)		18.0			
Intersection Capacity Utilization		98.5%					ICU Level of Service		F			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Honoapiilani Hwy & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	100	11	52	40	130	11	826	64	190	806	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1854	1547		1654		1770	1843		1770	1863	1547
Flt Permitted		0.92	1.00		0.84		0.22	1.00		0.06	1.00	1.00
Satd. Flow (perm)		1711	1547		1400		416	1843		110	1863	1547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	11	114	12	59	45	148	12	939	73	216	916	11
RTOR Reduction (vph)	0	0	10	0	42	0	0	2	0	0	0	3
Lane Group Flow (vph)	0	125	2	0	210	0	12	1010	0	216	916	8
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		19.7	19.7		20.2		73.8	71.9		88.6	82.7	82.7
Effective Green, g (s)		19.7	19.7		20.2		73.8	71.9		88.6	82.7	82.7
Actuated g/C Ratio		0.16	0.16		0.17		0.61	0.60		0.73	0.68	0.68
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		279	252		234		275	1096		255	1275	1059
v/s Ratio Prot							0.00	c0.55		c0.09	0.49	
v/s Ratio Perm		0.07	0.00		c0.15		0.03			0.53		0.00
v/c Ratio		0.45	0.01		0.90		0.04	0.92		0.85	0.72	0.01
Uniform Delay, d1		45.6	42.4		49.3		11.4	21.9		38.4	11.8	6.0
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.4	0.0		31.6		0.0	13.0		21.3	2.4	0.0
Delay (s)		46.1	42.4		80.9		11.4	34.9		59.6	14.3	6.0
Level of Service		D	D		F		B	C		E	B	A
Approach Delay (s)		45.7			80.9			34.6			22.8	
Approach LOS		D			F			C			C	
Intersection Summary												
HCM 2000 Control Delay		34.5										
HCM 2000 Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		120.8								16.5		
Intersection Capacity Utilization		90.9%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Waiko Rd & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	315	20	133	203	290	10	284	122	260	166	19
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
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)	1767	1843		1768	1863	1549	1767	1863	1549	1767	1827	
Flt Permitted	0.62	1.00		0.47	1.00	1.00	0.63	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	1154	1843		874	1863	1549	1173	1863	1549	1042	1827	
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	0.82
Adj. Flow (vph)	32	342	22	145	221	315	11	309	133	283	180	23
RTOR Reduction (vph)	0	6	0	0	0	201	0	0	78	0	11	0
Lane Group Flow (vph)	32	358	0	145	221	114	11	309	55	283	192	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	12.8	12.8		12.8	12.8	12.8	14.7	14.7	14.7	14.7	14.7	
Effective Green, g (s)	12.8	12.8		12.8	12.8	12.8	14.7	14.7	14.7	14.7	14.7	
Actuated g/C Ratio	0.36	0.36		0.36	0.36	0.36	0.41	0.41	0.41	0.41	0.41	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	416	664		315	671	558	485	771	641	431	756	
v/s Ratio Prot		c0.19			0.12			0.17			0.11	
v/s Ratio Perm	0.03			0.17		0.07	0.01		0.04	c0.27		
v/c Ratio	0.08	0.54		0.46	0.33	0.20	0.02	0.40	0.09	0.66	0.25	
Uniform Delay, d1	7.5	9.0		8.7	8.2	7.8	6.2	7.3	6.3	8.4	6.8	
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	0.8		1.1	0.3	0.2	0.0	0.3	0.1	3.6	0.2	
Delay (s)	7.5	9.9		9.8	8.5	8.0	6.2	7.6	6.4	12.0	7.0	
Level of Service	A	A		A	A	A	A	A	A	B	A	
Approach Delay (s)		9.7			8.6			7.2			9.9	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.8										
HCM 2000 Volume to Capacity ratio		0.60										
Actuated Cycle Length (s)		35.5										
Intersection Capacity Utilization		67.9%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	196	157	141	10	112	50	246	160	10	100	90	175
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	213	171	153	11	122	54	267	174	11	109	98	190
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	176			324			1056	871	247	865	921	149
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	176			324			1056	871	247	865	921	149
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			99			0	28	99	0	57	79
cM capacity (veh/h)	1400			1236			94	243	791	101	227	898
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total	213	324	11	176	267	185	109	288				
Volume Left	213	0	11	0	267	0	109	0				
Volume Right	0	153	0	54	0	11	0	190				
cSH	1400	1700	1236	1700	94	253	101	449				
Volume to Capacity	0.15	0.19	0.01	0.10	2.84	0.73	1.07	0.64				
Queue Length 95th (ft)	13	0	1	0	639	127	172	110				
Control Delay (s)	8.0	0.0	7.9	0.0	924.4	49.8	189.1	26.3				
Lane LOS	A		A		F	E	F	D				
Approach Delay (s)	3.2		0.5		567.0		70.9					
Approach LOS					F		F					
Intersection Summary												
Average Delay			182.0									
Intersection Capacity Utilization			62.7%		ICU Level of Service			B				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	484	200	90	490	560	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1728		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1728		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	538	222	100	544	622	257
RTOR Reduction (vph)	9	0	0	0	0	185
Lane Group Flow (vph)	751	0	100	544	622	72
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	32.4		7.7	35.5	22.8	22.8
Effective Green, g (s)	32.4		7.7	35.5	22.8	22.8
Actuated g/C Ratio	0.40		0.10	0.44	0.28	0.28
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	691		168	1551	996	445
v/s Ratio Prot	c0.43		c0.06	0.15	c0.18	
v/s Ratio Perm						0.05
v/c Ratio	1.09		0.60	0.35	0.62	0.16
Uniform Delay, d1	24.3		35.2	15.1	25.4	21.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	60.2		3.7	0.1	1.2	0.2
Delay (s)	84.5		38.9	15.2	26.6	22.1
Level of Service	F		D	B	C	C
Approach Delay (s)	84.5			18.9	25.3	
Approach LOS	F			B	C	

Intersection Summary

HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Honoapiilani Hwy & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	25	40	28	15	86	24	738	14	66	848	66
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1760	1665		1760	1588		1767	1863	1540	1767	1863	1540
Flt Permitted	0.69	1.00		0.71	1.00		0.19	1.00	1.00	0.26	1.00	1.00
Satd. Flow (perm)	1272	1665		1318	1588		348	1863	1540	474	1863	1540
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)	126	27	43	30	16	93	26	802	15	72	922	72
RTOR Reduction (vph)	0	35	0	0	76	0	0	0	5	0	0	24
Lane Group Flow (vph)	126	35	0	30	33	0	26	802	10	72	922	48
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.8	9.8		9.8	9.8		34.7	34.7	34.7	34.7	34.7	34.7
Effective Green, g (s)	9.8	9.8		9.8	9.8		34.7	34.7	34.7	34.7	34.7	34.7
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.66	0.66	0.66	0.66	0.66	0.66
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	237	310		246	296		230	1231	1017	313	1231	1017
v/s Ratio Prot		0.02			0.02			0.43			c0.49	
v/s Ratio Perm	c0.10			0.02			0.07		0.01	0.15		0.03
v/c Ratio	0.53	0.11		0.12	0.11		0.11	0.65	0.01	0.23	0.75	0.05
Uniform Delay, d1	19.3	17.7		17.8	17.7		3.3	5.3	3.0	3.6	6.0	3.1
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	2.3	0.2		0.2	0.2		0.2	1.2	0.0	0.4	2.5	0.0
Delay (s)	21.6	17.9		18.0	17.9		3.5	6.5	3.0	3.9	8.5	3.1
Level of Service	C	B		B	B		A	A	A	A	A	A
Approach Delay (s)		20.3			17.9			6.4			7.8	
Approach LOS		C			B			A			A	

Intersection Summary

HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	52.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

10: Waiale Rd & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	68	0	25	10	0	10	25	266	10	90	108	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	27	11	0	11	27	289	11	98	117	53
Approach Volume (veh/h)	101			22			327			268		
Crossing Volume (veh/h)	226			390			172			38		
High Capacity (veh/h)	1160			1019			1211			1344		
High v/c (veh/h)	0.09			0.02			0.27			0.20		
Low Capacity (veh/h)	957			830			1003			1124		
Low v/c (veh/h)	0.11			0.03			0.33			0.24		
Intersection Summary												
Maximum v/c High	0.27											
Maximum v/c Low	0.33											
Intersection Capacity Utilization	47.5%			ICU Level of Service			A					

HCM 2010 Roundabout
10: Waiale Rd & Main Street

10/13/2014

Intersection				
Intersection Delay, s/veh	6.6			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	101	22	327	268
Demand Flow Rate, veh/h	103	22	334	273
Vehicles Circulating, veh/h	230	398	175	39
Vehicles Exiting, veh/h	82	111	158	381
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.2	5.0	7.7	5.8
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	103	22	334	273
Cap Entry Lane, veh/h	898	759	949	1087
Entry HV Adj Factor	0.981	1.000	0.980	0.980
Flow Entry, veh/h	101	22	327	268
Cap Entry, veh/h	880	759	929	1065
V/C Ratio	0.115	0.029	0.352	0.251
Control Delay, s/veh	5.2	5.0	7.7	5.8
LOS	A	A	A	A
95th %tile Queue, veh	0	0	2	1

HCM Signalized Intersection Capacity Analysis

13: Honoapiilani Hwy & Waiale Rd

10/13/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	144	0	777	301	0	917
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.98		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1550		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1550		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	0	845	327	0	997
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	157	0	845	327	0	997
Confl. Peds. (#/hr)		2		2		
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	9.6		41.6	59.2		41.6
Effective Green, g (s)	9.6		41.6	59.2		41.6
Actuated g/C Ratio	0.16		0.70	1.00		0.70
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	287		1309	1550		1309
v/s Ratio Prot			0.45			c0.54
v/s Ratio Perm	c0.09			0.21		
v/c Ratio	0.55		0.65	0.21		0.76
Uniform Delay, d1	22.8		4.8	0.0		5.6
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	2.1		1.1	0.3		2.7
Delay (s)	24.9		5.9	0.3		8.3
Level of Service	C		A	A		A
Approach Delay (s)	24.9		4.3			8.3
Approach LOS	C		A			A

Intersection Summary

HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Honoapiilani Hwy & Kuihelani Hwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	760	10	10	10	998	610	10	860	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	10	10	792	10	10	10	1040	635	10	896	10
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	20	0	404	398	10	10	1040	635	10	896	4
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	37.1	37.1	105.3	0.9	44.4	105.3	0.9	44.4	44.4
Effective Green, g (s)		3.9	3.9	37.1	37.1	105.3	0.9	44.4	105.3	0.9	44.4	44.4
Actuated g/C Ratio		0.04	0.04	0.35	0.35	1.00	0.01	0.42	1.00	0.01	0.42	0.42
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		67	58	592	594	1583	15	1492	1583	15	1492	667
v/s Ratio Prot		0.01		c0.24	0.24		0.01	c0.29		0.01	0.25	
v/s Ratio Perm			0.00			0.01			c0.40			0.00
v/c Ratio		0.30	0.01	0.68	0.67	0.01	0.67	0.70	0.40	0.67	0.60	0.01
Uniform Delay, d1		49.4	48.8	29.1	28.9	0.0	52.1	24.9	0.0	52.1	23.6	17.7
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.5	0.0	3.2	3.0	0.0	62.4	1.6	0.8	62.4	0.8	0.0
Delay (s)		51.9	48.9	32.3	31.9	0.0	114.4	26.5	0.8	114.4	24.4	17.7
Level of Service		D	D	C	C	A	F	C	A	F	C	B
Approach Delay (s)		50.9			31.7			17.3			25.3	
Approach LOS		D			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			23.1									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			105.3									Sum of lost time (s) 19.0
Intersection Capacity Utilization			63.9%									ICU Level of Service B
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↑	↗	↖	↑	↗
Volume (vph)	20	80	32	384	140	390	43	568	351	370	582	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1583		1797	1526	1770	1863	1583	1770	1863	1583
Flt Permitted		0.65	1.00		0.72	1.00	0.25	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1214	1583		1333	1526	470	1863	1583	172	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	86	34	413	151	419	46	611	377	398	626	32
RTOR Reduction (vph)	0	0	22	0	0	171	0	0	239	0	0	17
Lane Group Flow (vph)	0	108	13	0	564	248	46	611	138	398	626	15
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.0	40.0		40.0	40.0	44.7	39.8	39.8	58.8	49.9	49.9
Effective Green, g (s)		40.0	40.0		40.0	40.0	44.7	39.8	39.8	58.8	49.9	49.9
Actuated g/C Ratio		0.37	0.37		0.37	0.37	0.41	0.37	0.37	0.54	0.46	0.46
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		446	581		490	561	251	681	579	313	854	726
v/s Ratio Prot							0.01	0.33		0.18	0.34	
v/s Ratio Perm		0.09	0.01		0.42	0.16	0.07		0.09	0.51		0.01
v/c Ratio		0.24	0.02		1.15	0.44	0.18	0.90	0.24	1.27	0.73	0.02
Uniform Delay, d1		23.9	21.9		34.4	26.0	20.7	32.6	24.0	33.1	24.0	16.1
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		0.2	0.0		89.3	0.4	0.1	15.4	0.4	144.9	4.0	0.0
Delay (s)		24.1	21.9		123.7	26.4	20.8	47.9	24.4	178.0	28.0	16.1
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		23.6			82.2			38.2			84.2	
Approach LOS		C			F			D			F	
Intersection Summary												
HCM 2000 Control Delay		66.1										
HCM 2000 Volume to Capacity ratio		1.26										
Actuated Cycle Length (s)		108.8										
Intersection Capacity Utilization		97.4%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	480	50	171	645	400	30	238	127	340	446	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1831		1770	1863	1583	1770	1752		1769	1760	
Flt Permitted	0.09	1.00		0.17	1.00	1.00	0.12	1.00		0.20	1.00	
Satd. Flow (perm)	168	1831		316	1863	1583	226	1752		373	1760	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	238	495	52	176	665	412	31	245	131	351	460	205
RTOR Reduction (vph)	0	3	0	0	0	237	0	14	0	0	11	0
Lane Group Flow (vph)	238	544	0	176	665	175	31	362	0	351	654	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	60.8	44.3		53.2	40.5	40.5	36.6	32.9		51.0	42.3	
Effective Green, g (s)	60.8	44.3		53.2	40.5	40.5	36.6	32.9		51.0	42.3	
Actuated g/C Ratio	0.49	0.36		0.43	0.33	0.33	0.30	0.27		0.41	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	297	659		286	613	521	113	468		303	605	
v/s Ratio Prot	c0.11	0.30		0.06	c0.36		0.01	0.21		c0.12	0.37	
v/s Ratio Perm	0.29			0.20		0.11	0.07			c0.36		
v/c Ratio	0.80	0.83		0.62	1.08	0.34	0.27	0.77		1.16	1.08	
Uniform Delay, d1	33.3	35.8		25.3	41.2	31.1	34.3	41.6		31.2	40.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.6	8.4		2.8	61.5	0.4	0.5	7.8		101.7	60.3	
Delay (s)	46.9	44.2		28.1	102.7	31.5	34.8	49.4		132.9	100.7	
Level of Service	D	D		C	F	C	C	D		F	F	
Approach Delay (s)		45.0			68.8			48.3			111.8	
Approach LOS		D			E			D			F	
Intersection Summary												
HCM 2000 Control Delay	73.6			HCM 2000 Level of Service			E					
HCM 2000 Volume to Capacity ratio	1.11											
Actuated Cycle Length (s)	123.0			Sum of lost time (s)			20.0					
Intersection Capacity Utilization	102.6%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	286	501	140	30	484	70	150	368	40	100	412	341
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
Hourly flow rate (vph)	292	511	143	31	494	71	153	376	41	102	420	348
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total (vph)	946	596	153	416	102	768						
Volume Left (vph)	292	31	153	0	102	0						
Volume Right (vph)	143	71	0	41	0	348						
Hadj (s)	0.01	-0.03	0.53	-0.03	0.53	-0.28						
Departure Headway (s)	9.5	9.4	10.2	9.6	10.2	9.3						
Degree Utilization, x	2.49	1.56	0.43	1.11	0.29	2.00						
Capacity (veh/h)	389	385	342	386	350	391						
Control Delay (s)	696.8	288.9	19.5	109.5	16.0	476.9						
Approach Delay (s)	696.8	288.9	85.3		422.9							
Approach LOS	F	F	F		F							
Intersection Summary												
Delay			418.5									
Level of Service			F									
Intersection Capacity Utilization			146.4%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔					↔	↔		↔	↔	↔
Volume (vph)	671	0	10	0	0	0	60	899	0	10	1237	884
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		1.00					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1772					1770	3539		1770	3539	1550
Flt Permitted		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1772					1770	3539		1770	3539	1550
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)	729	0	11	0	0	0	65	977	0	11	1345	961
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	405
Lane Group Flow (vph)	0	686	0	0	0	0	65	977	0	11	1345	556
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.1					7.8	78.8		1.3	72.3	72.3
Effective Green, g (s)		30.1					7.8	78.8		1.3	72.3	72.3
Actuated g/C Ratio		0.23					0.06	0.61		0.01	0.56	0.56
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		416					107	2175		17	1995	874
v/s Ratio Prot							c0.04	0.28		0.01	c0.38	
v/s Ratio Perm		0.39										0.36
v/c Ratio		1.65					0.61	0.45		0.65	0.67	0.64
Uniform Delay, d1		49.0					58.7	13.1		63.2	19.7	19.0
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		303.1					6.5	0.3		49.2	1.2	2.1
Delay (s)		352.2					65.2	13.5		112.4	20.9	21.1
Level of Service		F					E	B		F	C	C
Approach Delay (s)		352.2			0.0			16.7			21.4	
Approach LOS		F			A			B			C	
Intersection Summary												
HCM 2000 Control Delay		79.9										
HCM 2000 Volume to Capacity ratio		0.94										
Actuated Cycle Length (s)		128.2								18.0		
Intersection Capacity Utilization		90.3%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Honoapiilani Hwy & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	30	12	82	70	120	13	811	67	120	788	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.98		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.94		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1839	1583		1697		1770	1837		1770	1863	1543
Flt Permitted		0.85	1.00		0.88		0.22	1.00		0.09	1.00	1.00
Satd. Flow (perm)		1589	1583		1521		410	1837		159	1863	1543
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)	11	33	13	89	76	130	14	882	73	130	857	11
RTOR Reduction (vph)	0	0	10	0	22	0	0	2	0	0	0	4
Lane Group Flow (vph)	0	44	3	0	273	0	14	953	0	130	857	7
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		22.6	22.6		23.1		69.4	67.5		80.3	74.4	74.4
Effective Green, g (s)		22.6	22.6		23.1		69.4	67.5		80.3	74.4	74.4
Actuated g/C Ratio		0.20	0.20		0.20		0.60	0.58		0.70	0.64	0.64
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		311	310		304		268	1074		233	1201	994
v/s Ratio Prot							0.00	c0.52		c0.04	c0.46	
v/s Ratio Perm		0.03	0.00		c0.18		0.03			0.35		0.00
v/c Ratio		0.14	0.01		0.90		0.05	0.89		0.56	0.71	0.01
Uniform Delay, d1		38.4	37.4		45.0		11.9	20.7		20.9	13.5	7.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		26.3		0.0	9.7		1.6	2.5	0.0
Delay (s)		38.5	37.4		71.3		11.9	30.4		22.5	16.0	7.3
Level of Service		D	D		E		B	C		C	B	A
Approach Delay (s)		38.2			71.3			30.1			16.8	
Approach LOS		D			E			C			B	
Intersection Summary												
HCM 2000 Control Delay		29.8										
HCM 2000 Volume to Capacity ratio		0.87										
Actuated Cycle Length (s)		115.4								16.5		
Intersection Capacity Utilization		89.0%								E		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Waiko Rd & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	193	10	126	210	210	20	155	143	210	291	41
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
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)	1767	1847		1767	1863	1549	1768	1863	1549	1767	1823	
Flt Permitted	0.62	1.00		0.62	1.00	1.00	0.52	1.00	1.00	0.65	1.00	
Satd. Flow (perm)	1146	1847		1154	1863	1549	964	1863	1549	1211	1823	
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)	26	210	11	137	228	228	22	168	155	228	316	45
RTOR Reduction (vph)	0	5	0	0	0	152	0	0	90	0	12	0
Lane Group Flow (vph)	26	216	0	137	228	76	22	168	65	228	349	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	10.7	10.7		10.7	10.7	10.7	13.6	13.6	13.6	13.6	13.6	
Effective Green, g (s)	10.7	10.7		10.7	10.7	10.7	13.6	13.6	13.6	13.6	13.6	
Actuated g/C Ratio	0.33	0.33		0.33	0.33	0.33	0.42	0.42	0.42	0.42	0.42	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	379	611		382	617	513	405	784	652	509	767	
v/s Ratio Prot		0.12			c0.12			0.09			c0.19	
v/s Ratio Perm	0.02			0.12		0.05	0.02		0.04	0.19		
v/c Ratio	0.07	0.35		0.36	0.37	0.15	0.05	0.21	0.10	0.45	0.46	
Uniform Delay, d1	7.4	8.2		8.2	8.2	7.6	5.5	5.9	5.7	6.7	6.7	
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	0.4		0.6	0.4	0.1	0.1	0.1	0.1	0.6	0.4	
Delay (s)	7.5	8.5		8.8	8.6	7.7	5.6	6.1	5.7	7.3	7.1	
Level of Service	A	A		A	A	A	A	A	A	A	A	
Approach Delay (s)		8.4			8.3			5.9			7.2	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.5										
HCM 2000 Volume to Capacity ratio		0.42										
Actuated Cycle Length (s)		32.3										
Intersection Capacity Utilization		52.5%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	158	120	183	20	160	130	126	80	10	100	130	175
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	172	130	199	22	174	141	137	87	11	109	141	190
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	315			329			1052	932	230	816	961	245
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	315			329			1052	932	230	816	961	245
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			98			0	61	99	40	35	76
cM capacity (veh/h)	1245			1230			67	226	809	182	217	794
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total	172	329	22	315	137	98	109	332				
Volume Left	172	0	22	0	137	0	109	0				
Volume Right	0	199	0	141	0	11	0	190				
cSH	1245	1700	1230	1700	67	245	182	372				
Volume to Capacity	0.14	0.19	0.02	0.19	2.05	0.40	0.60	0.89				
Queue Length 95th (ft)	12	0	1	0	320	45	82	222				
Control Delay (s)	8.4	0.0	8.0	0.0	621.7	29.1	50.6	57.0				
Lane LOS	A		A		F	D	F	F				
Approach Delay (s)	2.9		0.5		374.8		55.4					
Approach LOS					F		F					
Intersection Summary												
Average Delay	75.3											
Intersection Capacity Utilization	63.0%			ICU Level of Service			B					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	209	90	130	610	650	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1727		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1727		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	230	99	143	670	714	403
RTOR Reduction (vph)	12	0	0	0	0	261
Lane Group Flow (vph)	317	0	143	670	714	142
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	19.7		11.5	43.2	26.7	26.7
Effective Green, g (s)	19.7		11.5	43.2	26.7	26.7
Actuated g/C Ratio	0.26		0.15	0.57	0.35	0.35
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	447		267	2011	1243	556
v/s Ratio Prot	c0.18		c0.08	0.19	c0.20	
v/s Ratio Perm						0.09
v/c Ratio	0.71		0.54	0.33	0.57	0.25
Uniform Delay, d1	25.6		29.8	8.7	20.0	17.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2		1.0	0.1	0.6	0.2
Delay (s)	29.7		30.8	8.8	20.7	17.8
Level of Service	C		C	A	C	B
Approach Delay (s)	29.7			12.7	19.6	
Approach LOS	C			B	B	

Intersection Summary

HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Honoapiilani Hwy & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	36	51	32	41	91	62	886	40	108	667	158
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1757	1672		1758	1638		1765	1863	1536	1770	1863	1536
Flt Permitted	0.62	1.00		0.70	1.00		0.31	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1140	1672		1288	1638		568	1863	1536	334	1863	1536
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)	136	39	55	35	45	99	67	963	43	117	725	172
RTOR Reduction (vph)	0	44	0	0	80	0	0	0	13	0	0	53
Lane Group Flow (vph)	136	50	0	35	64	0	67	963	30	117	725	119
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.8	13.8		13.8	13.8		49.6	49.6	49.6	49.6	49.6	49.6
Effective Green, g (s)	13.8	13.8		13.8	13.8		49.6	49.6	49.6	49.6	49.6	49.6
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.69	0.69	0.69	0.69	0.69	0.69
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	220	323		248	316		394	1294	1067	232	1294	1067
v/s Ratio Prot		0.03			0.04			c0.52			0.39	
v/s Ratio Perm	c0.12			0.03			0.12		0.02	0.35		0.08
v/c Ratio	0.62	0.15		0.14	0.20		0.17	0.74	0.03	0.50	0.56	0.11
Uniform Delay, d1	26.4	23.9		23.9	24.2		3.8	6.9	3.4	5.1	5.4	3.6
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	5.1	0.2		0.3	0.3		0.2	2.4	0.0	1.7	0.6	0.0
Delay (s)	31.5	24.2		24.1	24.5		4.0	9.3	3.4	6.8	6.0	3.7
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		28.5			24.4			8.7			5.7	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.4			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			71.4			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			82.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

10: Waiale Rd & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	130	0	64	10	0	90	65	80	10	10	236	142
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	141	0	70	11	0	98	71	87	11	11	257	154
Approach Volume (veh/h)	211				109				168		422	
Crossing Volume (veh/h)	278				299				152		82	
High Capacity (veh/h)	1113				1095				1229		1299	
High v/c (veh/h)	0.19				0.10				0.14		0.32	
Low Capacity (veh/h)	915				899				1020		1084	
Low v/c (veh/h)	0.23				0.12				0.17		0.39	
Intersection Summary												
Maximum v/c High			0.32									
Maximum v/c Low			0.39									
Intersection Capacity Utilization			57.8%		ICU Level of Service				B			

HCM 2010 Roundabout
10: Waiale Rd & Main Street

10/13/2014

Intersection				
Intersection Delay, s/veh	7.1			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	211	109	169	422
Demand Flow Rate, veh/h	215	111	172	430
Vehicles Circulating, veh/h	284	305	155	83
Vehicles Exiting, veh/h	229	22	344	333
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.0	5.7	5.5	8.1
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	215	111	172	430
Cap Entry Lane, veh/h	851	833	968	1040
Entry HV Adj Factor	0.981	0.982	0.984	0.981
Flow Entry, veh/h	211	109	169	422
Cap Entry, veh/h	835	818	952	1020
V/C Ratio	0.253	0.133	0.178	0.413
Control Delay, s/veh	7.0	5.7	5.5	8.1
LOS	A	A	A	A
95th %tile Queue, veh	1	0	1	2

HCM Signalized Intersection Capacity Analysis

13: Honoapiilani Hwy & Waiale Rd

10/13/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	323	0	988	155	0	748
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.98		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1550		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1550		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	351	0	1074	168	0	813
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	351	0	1074	168	0	813
Confl. Peds. (#/hr)		2		2		
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	17.6		44.3	69.9		44.3
Effective Green, g (s)	17.6		44.3	69.9		44.3
Actuated g/C Ratio	0.25		0.63	1.00		0.63
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	445		1180	1550		1180
v/s Ratio Prot			c0.58			0.44
v/s Ratio Perm	c0.20			0.11		
v/c Ratio	0.79		0.91	0.11		0.69
Uniform Delay, d1	24.4		11.1	0.0		8.3
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	9.0		10.5	0.1		1.7
Delay (s)	33.4		21.6	0.1		10.0
Level of Service	C		C	A		B
Approach Delay (s)	33.4		18.7			10.0
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	69.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Honoapiilani Hwy & Kuihelani Hwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	720	10	10	10	883	730	10	981	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	11	11	766	11	11	11	939	777	11	1044	11
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	22	0	391	386	11	11	939	777	11	1044	5
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	36.0	36.0	106.0	1.9	45.2	106.0	1.9	45.2	45.2
Effective Green, g (s)		3.9	3.9	36.0	36.0	106.0	1.9	45.2	106.0	1.9	45.2	45.2
Actuated g/C Ratio		0.04	0.04	0.34	0.34	1.00	0.02	0.43	1.00	0.02	0.43	0.43
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		66	58	570	573	1583	31	1509	1583	31	1509	675
v/s Ratio Prot		0.01		c0.23	0.23		0.01	0.27		0.01	c0.29	
v/s Ratio Perm			0.00			0.01			c0.49			0.00
v/c Ratio		0.33	0.01	0.69	0.67	0.01	0.35	0.62	0.49	0.35	0.69	0.01
Uniform Delay, d1		49.8	49.2	30.1	30.0	0.0	51.4	23.7	0.0	51.4	24.7	17.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.0	0.0	3.4	3.1	0.0	2.5	0.9	1.1	2.5	1.5	0.0
Delay (s)		52.8	49.2	33.6	33.1	0.0	54.0	24.6	1.1	54.0	26.2	17.5
Level of Service		D	D	C	C	A	D	C	A	D	C	B
Approach Delay (s)		51.6			32.9			14.2			26.4	
Approach LOS		D			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			22.2		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			106.0		Sum of lost time (s)					19.0		
Intersection Capacity Utilization			64.0%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

LOS Worksheets – Year 2026 without Project Conditions

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	210	80	270	150	320	60	440	370	460	510	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1848	1550		1803	1583	1770	1863	1547	1770	1863	1583
Flt Permitted		0.69	1.00		0.53	1.00	0.29	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)		1290	1550		994	1583	536	1863	1547	333	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	236	90	303	169	360	67	494	416	517	573	11
RTOR Reduction (vph)	0	0	56	0	0	173	0	0	234	0	0	6
Lane Group Flow (vph)	0	281	34	0	472	187	67	494	182	517	573	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.1	40.1		40.1	40.1	41.3	36.0	36.0	55.1	45.8	45.8
Effective Green, g (s)		40.1	40.1		40.1	40.1	41.3	36.0	36.0	55.1	45.8	45.8
Actuated g/C Ratio		0.38	0.38		0.38	0.38	0.39	0.34	0.34	0.52	0.44	0.44
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		491	590		378	603	272	637	529	380	811	689
v/s Ratio Prot							0.01	0.27		0.19	0.31	
v/s Ratio Perm		0.22	0.02		0.47	0.12	0.08		0.12	0.52		0.00
v/c Ratio		0.57	0.06		1.25	0.31	0.25	0.78	0.34	1.36	0.71	0.01
Uniform Delay, d1		25.8	20.6		32.5	22.8	21.0	31.0	25.8	23.3	24.2	16.8
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	0.0		132.2	0.2	0.2	6.9	0.8	178.5	3.5	0.0
Delay (s)		27.1	20.6		164.7	23.1	21.2	37.8	26.6	201.8	27.8	16.8
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		25.5			103.4			31.9			109.4	
Approach LOS		C			F			C			F	
Intersection Summary												
HCM 2000 Control Delay		75.3										
HCM 2000 Volume to Capacity ratio		1.35										
Actuated Cycle Length (s)		105.2										
Intersection Capacity Utilization		100.6%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	350	620	70	90	430	400	140	490	160	250	190	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1830		1770	1863	1539	1770	1781		1770	1735	
Flt Permitted	0.11	1.00		0.11	1.00	1.00	0.37	1.00		0.09	1.00	
Satd. Flow (perm)	213	1830		201	1863	1539	697	1781		165	1735	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	365	646	73	94	448	417	146	510	167	260	198	167
RTOR Reduction (vph)	0	2	0	0	0	157	0	8	0	0	21	0
Lane Group Flow (vph)	365	717	0	94	448	260	146	669	0	260	344	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	67.0	53.4		45.7	37.1	37.1	48.0	40.2		58.3	45.5	
Effective Green, g (s)	67.0	53.4		45.7	37.1	37.1	48.0	40.2		58.3	45.5	
Actuated g/C Ratio	0.50	0.39		0.34	0.27	0.27	0.35	0.30		0.43	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	392	722		167	510	422	309	529		226	583	
v/s Ratio Prot	c0.17	c0.39		0.04	0.24		0.03	c0.38		c0.11	0.20	
v/s Ratio Perm	0.29			0.15		0.17	0.14			0.38		
v/c Ratio	0.93	0.99		0.56	0.88	0.62	0.47	1.26		1.15	0.59	
Uniform Delay, d1	38.8	40.8		35.6	46.9	42.9	31.4	47.6		40.2	37.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	28.3	31.5		2.6	15.7	2.7	0.4	133.2		106.4	1.5	
Delay (s)	67.2	72.2		38.2	62.6	45.6	31.9	180.8		146.7	38.7	
Level of Service	E	E		D	E	D	C	F		F	D	
Approach Delay (s)		70.5			52.8			154.4			83.6	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay	87.8			HCM 2000 Level of Service			F					
HCM 2000 Volume to Capacity ratio	1.12											
Actuated Cycle Length (s)	135.3			Sum of lost time (s)			20.0					
Intersection Capacity Utilization	108.2%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	140	390	160	70	420	230	250	620	80	120	490	160
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
Hourly flow rate (vph)	147	411	168	74	442	242	263	653	84	126	516	168
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total (vph)	726	758	263	737	126	684						
Volume Left (vph)	147	74	263	0	126	0						
Volume Right (vph)	168	242	0	84	0	168						
Hadj (s)	-0.06	-0.14	0.53	-0.05	0.53	-0.14						
Departure Headway (s)	9.4	9.3	10.2	9.6	10.2	9.5						
Degree Utilization, x	1.90	1.96	0.74	1.96	0.36	1.80						
Capacity (veh/h)	389	392	349	381	351	384						
Control Delay (s)	434.3	463.7	36.2	462.7	17.5	393.2						
Approach Delay (s)	434.3	463.7	350.5		334.6							
Approach LOS	F	F	F		F							
Intersection Summary												
Delay			391.1									
Level of Service			F									
Intersection Capacity Utilization			126.6%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	810	0	50	0	0	0	110	1260	0	0	910	600
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	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)		1765					1770	3539			3539	1583
Flt Permitted		0.96					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1765					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	844	0	52	0	0	0	115	1312	0	0	948	625
RTOR Reduction (vph)	0	51	0	0	0	0	0	0	0	0	0	336
Lane Group Flow (vph)	0	845	0	0	0	0	115	1312	0	0	948	289
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.7					11.9	68.9			52.0	52.0
Effective Green, g (s)		30.7					11.9	68.9			52.0	52.0
Actuated g/C Ratio		0.27					0.11	0.61			0.46	0.46
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		481					187	2165			1634	731
v/s Ratio Prot							0.06	c0.37			0.27	
v/s Ratio Perm		0.48										0.18
v/c Ratio		1.76					0.61	0.61			0.58	0.39
Uniform Delay, d1		40.9					48.2	13.5			22.3	19.9
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		349.1					4.2	0.7			0.8	0.7
Delay (s)		390.0					52.3	14.2			23.1	20.7
Level of Service		F					D	B			C	C
Approach Delay (s)		390.0			0.0			17.3			22.1	
Approach LOS		F			A			B			C	
Intersection Summary												
HCM 2000 Control Delay		105.0					HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio		1.01										
Actuated Cycle Length (s)		112.6					Sum of lost time (s)			18.0		
Intersection Capacity Utilization		101.1%					ICU Level of Service			G		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Honoapiilani Hwy & Waiko Rd

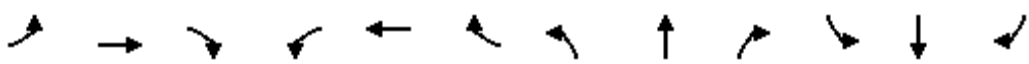
10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	120	10	30	60	60	10	710	20	200	700	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1856	1546		1715		1769	1855		1770	1863	1548
Flt Permitted		0.96	1.00		0.89		0.30	1.00		0.16	1.00	1.00
Satd. Flow (perm)		1788	1546		1539		553	1855		294	1863	1548
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	11	136	11	34	68	68	11	807	23	227	795	11
RTOR Reduction (vph)	0	0	9	0	20	0	0	1	0	0	0	4
Lane Group Flow (vph)	0	147	2	0	150	0	11	829	0	227	795	7
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		13.5	13.5		14.0		53.5	52.8		65.9	61.2	61.2
Effective Green, g (s)		13.5	13.5		14.0		53.5	52.8		65.9	61.2	61.2
Actuated g/C Ratio		0.15	0.15		0.15		0.58	0.57		0.72	0.67	0.67
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		262	227		234		331	1065		356	1240	1030
v/s Ratio Prot							0.00	c0.45		c0.06	0.43	
v/s Ratio Perm		0.08	0.00		c0.10		0.02			0.39		0.00
v/c Ratio		0.56	0.01		0.64		0.03	0.78		0.64	0.64	0.01
Uniform Delay, d1		36.4	33.5		36.6		8.6	15.0		12.4	8.9	5.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.6	0.0		4.2		0.0	4.3		2.7	1.6	0.0
Delay (s)		38.1	33.5		40.8		8.6	19.3		15.2	10.5	5.2
Level of Service		D	C		D		A	B		B	B	A
Approach Delay (s)		37.8			40.8			19.2			11.5	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		18.6										
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		91.9								16.5		
Intersection Capacity Utilization		78.3%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Waiko Rd & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	330	20	110	140	360	10	230	90	290	80	10
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
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)	1767	1844		1768	1863	1549	1767	1863	1549	1767	1824	
Flt Permitted	0.66	1.00		0.45	1.00	1.00	0.69	1.00	1.00	0.60	1.00	
Satd. Flow (perm)	1228	1844		838	1863	1549	1289	1863	1549	1124	1824	
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	0.82
Adj. Flow (vph)	11	359	22	120	152	391	11	250	98	315	87	12
RTOR Reduction (vph)	0	5	0	0	0	250	0	0	58	0	7	0
Lane Group Flow (vph)	11	376	0	120	152	141	11	250	40	315	92	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	12.6	12.6		12.6	12.6	12.6	14.4	14.4	14.4	14.4	14.4	
Effective Green, g (s)	12.6	12.6		12.6	12.6	12.6	14.4	14.4	14.4	14.4	14.4	
Actuated g/C Ratio	0.36	0.36		0.36	0.36	0.36	0.41	0.41	0.41	0.41	0.41	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	442	663		301	670	557	530	766	637	462	750	
v/s Ratio Prot		c0.20			0.08			0.13			0.05	
v/s Ratio Perm	0.01			0.14		0.09	0.01		0.03	c0.28		
v/c Ratio	0.02	0.57		0.40	0.23	0.25	0.02	0.33	0.06	0.68	0.12	
Uniform Delay, d1	7.2	9.0		8.4	7.8	7.9	6.1	7.0	6.2	8.4	6.4	
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	0.0	1.1		0.9	0.2	0.2	0.0	0.3	0.0	4.1	0.1	
Delay (s)	7.3	10.1		9.2	8.0	8.1	6.1	7.3	6.3	12.5	6.5	
Level of Service	A	B		A	A	A	A	A	A	B	A	
Approach Delay (s)		10.0			8.3			6.9			11.1	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay		9.0										
HCM 2000 Volume to Capacity ratio		0.63										
Actuated Cycle Length (s)		35.0										
Intersection Capacity Utilization		66.4%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	220	150	140	10	100	50	250	180	10	100	90	180
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	239	163	152	11	109	54	272	196	11	109	98	196
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	163			315			1092	902	239	908	951	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	163			315			1092	902	239	908	951	136
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			99			0	14	99	0	54	79
cM capacity (veh/h)	1416			1245			85	229	800	62	214	913
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total	239	315	11	163	272	207	109	293				
Volume Left	239	0	11	0	272	0	109	0				
Volume Right	0	152	0	54	0	11	0	196				
cSH	1416	1700	1245	1700	85	237	62	437				
Volume to Capacity	0.17	0.19	0.01	0.10	3.21	0.87	1.75	0.67				
Queue Length 95th (ft)	15	0	1	0	Err	177	248	121				
Control Delay (s)	8.1	0.0	7.9	0.0	Err	73.3	503.8	28.5				
Lane LOS	A		A		F	F	F	D				
Approach Delay (s)	3.5		0.5		5712.9		157.0					
Approach LOS					F		F					
Intersection Summary												
Average Delay			1738.9									
Intersection Capacity Utilization			63.5%		ICU Level of Service					B		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	500	180	90	600	570	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1733		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1733		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	556	200	100	667	633	267
RTOR Reduction (vph)	8	0	0	0	0	191
Lane Group Flow (vph)	748	0	100	667	633	76
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	32.4		7.8	35.8	23.0	23.0
Effective Green, g (s)	32.4		7.8	35.8	23.0	23.0
Actuated g/C Ratio	0.40		0.10	0.44	0.28	0.28
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	690		169	1558	1001	447
v/s Ratio Prot	c0.43		c0.06	0.19	c0.18	
v/s Ratio Perm						0.05
v/c Ratio	1.08		0.59	0.43	0.63	0.17
Uniform Delay, d1	24.4		35.2	15.7	25.5	22.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	59.4		3.7	0.2	1.3	0.2
Delay (s)	83.8		38.9	15.9	26.8	22.1
Level of Service	F		D	B	C	C
Approach Delay (s)	83.8			18.9	25.4	
Approach LOS	F			B	C	

Intersection Summary

HCM 2000 Control Delay	41.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	18.1
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

13: Honoapiilani Hwy & Waiale Rd

10/13/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	120	0	790	340	0	870
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1583		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1583		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	0	859	370	0	946
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	130	0	859	370	0	946
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	7.7		38.8	54.5		38.8
Effective Green, g (s)	7.7		38.8	54.5		38.8
Actuated g/C Ratio	0.14		0.71	1.00		0.71
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	250		1326	1583		1326
v/s Ratio Prot			0.46			c0.51
v/s Ratio Perm	c0.07			0.23		
v/c Ratio	0.52		0.65	0.23		0.71
Uniform Delay, d1	21.7		4.2	0.0		4.6
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	1.9		1.1	0.3		1.8
Delay (s)	23.6		5.3	0.3		6.4
Level of Service	C		A	A		A
Approach Delay (s)	23.6		3.8			6.4
Approach LOS	C		A			A

Intersection Summary

HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

14: Honoapiilani Hwy & Kuihelani Hwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	740	10	10	10	1040	700	10	800	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	10	10	771	10	10	10	1083	729	10	833	10
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	20	0	393	388	10	10	1083	729	10	833	4
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	36.7	36.7	108.6	1.9	47.1	108.6	1.9	47.1	47.1
Effective Green, g (s)		3.9	3.9	36.7	36.7	108.6	1.9	47.1	108.6	1.9	47.1	47.1
Actuated g/C Ratio		0.04	0.04	0.34	0.34	1.00	0.02	0.43	1.00	0.02	0.43	0.43
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		65	56	568	570	1583	30	1534	1583	30	1534	686
v/s Ratio Prot		0.01		c0.23	0.23		0.01	c0.31		0.01	0.24	
v/s Ratio Perm			0.00			0.01			c0.46			0.00
v/c Ratio		0.31	0.01	0.69	0.68	0.01	0.33	0.71	0.46	0.33	0.54	0.01
Uniform Delay, d1		51.0	50.5	31.1	30.9	0.0	52.7	25.1	0.0	52.7	22.8	17.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.7	0.0	3.6	3.3	0.0	2.4	1.6	1.0	2.4	0.5	0.0
Delay (s)		53.7	50.5	34.7	34.3	0.0	55.1	26.7	1.0	55.1	23.3	17.5
Level of Service		D	D	C	C	A	E	C	A	E	C	B
Approach Delay (s)		52.7			34.0			16.6			23.6	
Approach LOS		D			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			22.5		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			108.6		Sum of lost time (s)					19.0		
Intersection Capacity Utilization			64.5%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↑	↗	↖	↑	↗
Volume (vph)	20	100	30	280	170	410	70	480	270	400	490	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1846	1583		1807	1527	1770	1863	1583	1770	1863	1583
Flt Permitted		0.82	1.00		0.73	1.00	0.34	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)		1522	1583		1366	1527	640	1863	1583	304	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	108	32	301	183	441	75	516	290	430	527	43
RTOR Reduction (vph)	0	0	20	0	0	208	0	0	189	0	0	24
Lane Group Flow (vph)	0	130	12	0	484	233	75	516	101	430	527	19
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		39.2	39.2		39.2	39.2	41.9	36.4	36.4	55.5	46.0	46.0
Effective Green, g (s)		39.2	39.2		39.2	39.2	41.9	36.4	36.4	55.5	46.0	46.0
Actuated g/C Ratio		0.37	0.37		0.37	0.37	0.40	0.35	0.35	0.53	0.44	0.44
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		569	592		511	571	315	647	550	372	818	695
v/s Ratio Prot							0.01	0.28		0.17	0.28	
v/s Ratio Perm		0.09	0.01		0.35	0.15	0.08		0.06	0.44		0.01
v/c Ratio		0.23	0.02		0.95	0.41	0.24	0.80	0.18	1.16	0.64	0.03
Uniform Delay, d1		22.4	20.6		31.7	24.2	20.2	30.8	23.8	24.7	23.0	16.7
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	0.0		26.8	0.3	0.1	7.8	0.3	96.3	2.4	0.0
Delay (s)		22.6	20.7		58.6	24.5	20.3	38.6	24.1	121.0	25.3	16.7
Level of Service		C	C		E	C	C	D	C	F	C	B
Approach Delay (s)		22.2			42.3			32.3			66.1	
Approach LOS		C			D			C			E	
Intersection Summary												
HCM 2000 Control Delay		46.3										
HCM 2000 Volume to Capacity ratio		1.10										
Actuated Cycle Length (s)		104.7										
Intersection Capacity Utilization		90.2%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	460	80	110	660	400	30	220	70	360	430	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1814		1769	1863	1583	1770	1786		1769	1790	
Flt Permitted	0.09	1.00		0.19	1.00	1.00	0.14	1.00		0.30	1.00	
Satd. Flow (perm)	168	1814		361	1863	1583	258	1786		550	1790	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	186	474	82	113	680	412	31	227	72	371	443	124
RTOR Reduction (vph)	0	4	0	0	0	226	0	8	0	0	7	0
Lane Group Flow (vph)	186	552	0	113	680	186	31	291	0	371	560	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	56.9	44.3		49.1	40.4	40.4	33.8	30.1		48.2	39.5	
Effective Green, g (s)	56.9	44.3		49.1	40.4	40.4	33.8	30.1		48.2	39.5	
Actuated g/C Ratio	0.49	0.38		0.42	0.35	0.35	0.29	0.26		0.41	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	255	691		257	647	550	123	462		365	608	
v/s Ratio Prot	c0.08	c0.30		0.03	c0.37		0.01	0.16		c0.11	0.31	
v/s Ratio Perm	0.28			0.15		0.12	0.07			c0.31		
v/c Ratio	0.73	0.80		0.44	1.05	0.34	0.25	0.63		1.02	0.92	
Uniform Delay, d1	27.1	32.0		23.4	37.9	28.0	31.7	38.1		31.3	36.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.5	6.4		0.4	49.5	0.4	0.4	2.7		51.3	19.5	
Delay (s)	35.6	38.4		23.8	87.4	28.4	32.1	40.8		82.6	56.4	
Level of Service	D	D		C	F	C	C	D		F	E	
Approach Delay (s)		37.7			61.3			40.0			66.8	
Approach LOS		D			E			D			E	
Intersection Summary												
HCM 2000 Control Delay		55.3			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.03										
Actuated Cycle Length (s)		116.2			Sum of lost time (s)			20.0				
Intersection Capacity Utilization		97.4%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	430	170	30	440	90	130	390	40	100	470	300
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
Hourly flow rate (vph)	235	439	173	31	449	92	133	398	41	102	480	306
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total (vph)	847	571	133	439	102	786						
Volume Left (vph)	235	31	133	0	102	0						
Volume Right (vph)	173	92	0	41	0	306						
Hadj (s)	-0.03	-0.05	0.53	-0.03	0.53	-0.24						
Departure Headway (s)	9.4	9.4	10.2	9.6	10.2	9.4						
Degree Utilization, x	2.22	1.49	0.37	1.17	0.29	2.05						
Capacity (veh/h)	389	394	351	379	350	390						
Control Delay (s)	576.9	259.9	17.9	130.3	16.0	501.2						
Approach Delay (s)	576.9	259.9	104.2		445.4							
Approach LOS	F	F	F		F							
Intersection Summary												
Delay			379.5									
Level of Service			F									
Intersection Capacity Utilization			139.7%	ICU Level of Service		H						
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	650	0	10	0	0	0	70	900	0	10	1330	850
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		1.00					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1772					1770	3539		1770	3539	1550
Flt Permitted		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1772					1770	3539		1770	3539	1550
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)	707	0	11	0	0	0	76	978	0	11	1446	924
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	396
Lane Group Flow (vph)	0	664	0	0	0	0	76	978	0	11	1446	528
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.1					8.5	80.4		1.3	73.2	73.2
Effective Green, g (s)		30.1					8.5	80.4		1.3	73.2	73.2
Actuated g/C Ratio		0.23					0.07	0.62		0.01	0.56	0.56
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		410					115	2192		17	1995	874
v/s Ratio Prot							c0.04	0.28		0.01	c0.41	
v/s Ratio Perm		0.37										0.34
v/c Ratio		1.62					0.66	0.45		0.65	0.72	0.60
Uniform Delay, d1		49.9					59.2	13.0		64.0	20.9	18.7
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		290.1					10.5	0.3		49.2	1.6	1.7
Delay (s)		339.9					69.7	13.3		113.2	22.5	20.5
Level of Service		F					E	B		F	C	C
Approach Delay (s)		339.9			0.0			17.4			22.1	
Approach LOS		F			A			B			C	
Intersection Summary												
HCM 2000 Control Delay		75.9					HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio		0.96										
Actuated Cycle Length (s)		129.8					Sum of lost time (s)			18.0		
Intersection Capacity Utilization		92.3%					ICU Level of Service			F		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Honoapiilani Hwy & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	50	10	30	90	120	10	670	30	80	620	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.98		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1847	1583		1695		1769	1848		1770	1863	1545
Flt Permitted		0.91	1.00		0.95		0.32	1.00		0.19	1.00	1.00
Satd. Flow (perm)		1687	1583		1622		599	1848		355	1863	1545
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)	11	54	11	33	98	130	11	728	33	87	674	11
RTOR Reduction (vph)	0	0	9	0	28	0	0	1	0	0	0	4
Lane Group Flow (vph)	0	65	2	0	233	0	11	760	0	87	674	7
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		17.1	17.1		17.6		49.6	48.9		57.7	53.0	53.0
Effective Green, g (s)		17.1	17.1		17.6		49.6	48.9		57.7	53.0	53.0
Actuated g/C Ratio		0.20	0.20		0.20		0.57	0.56		0.66	0.61	0.61
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		330	310		327		349	1035		312	1131	937
v/s Ratio Prot							0.00	c0.41		c0.02	c0.36	
v/s Ratio Perm		0.04	0.00		c0.14		0.02			0.17		0.00
v/c Ratio		0.20	0.01		0.71		0.03	0.73		0.28	0.60	0.01
Uniform Delay, d1		29.4	28.3		32.5		8.8	14.3		9.7	10.6	6.8
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		6.0		0.0	3.3		0.2	1.3	0.0
Delay (s)		29.5	28.3		38.5		8.8	17.7		9.9	11.8	6.8
Level of Service		C	C		D		A	B		A	B	A
Approach Delay (s)		29.3			38.5			17.5			11.6	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		18.5										
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		87.3										
Intersection Capacity Utilization		75.3%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Waiko Rd & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	150	10	80	210	240	20	70	100	260	210	20
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
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)	1767	1843		1767	1863	1549	1767	1863	1549	1767	1835	
Flt Permitted	0.62	1.00		0.65	1.00	1.00	0.60	1.00	1.00	0.71	1.00	
Satd. Flow (perm)	1146	1843		1204	1863	1549	1124	1863	1549	1316	1835	
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)	11	163	11	87	228	261	22	76	109	283	228	22
RTOR Reduction (vph)	0	6	0	0	0	176	0	0	62	0	7	0
Lane Group Flow (vph)	11	168	0	87	228	85	22	76	47	283	243	0
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	10.6	10.6		10.6	10.6	10.6	13.9	13.9	13.9	13.9	13.9	
Effective Green, g (s)	10.6	10.6		10.6	10.6	10.6	13.9	13.9	13.9	13.9	13.9	
Actuated g/C Ratio	0.33	0.33		0.33	0.33	0.33	0.43	0.43	0.43	0.43	0.43	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	373	601		392	607	505	480	796	662	562	784	
v/s Ratio Prot		0.09			c0.12			0.04				0.13
v/s Ratio Perm	0.01			0.07		0.05	0.02		0.03	c0.22		
v/c Ratio	0.03	0.28		0.22	0.38	0.17	0.05	0.10	0.07	0.50	0.31	
Uniform Delay, d1	7.5	8.1		8.0	8.4	7.8	5.4	5.5	5.5	6.8	6.1	
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	0.0	0.3		0.3	0.4	0.2	0.0	0.1	0.0	0.7	0.2	
Delay (s)	7.5	8.4		8.2	8.8	8.0	5.5	5.6	5.5	7.5	6.4	
Level of Service	A	A		A	A	A	A	A	A	A	A	
Approach Delay (s)		8.3			8.3			5.6			7.0	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.5										
HCM 2000 Volume to Capacity ratio		0.45										
Actuated Cycle Length (s)		32.5										
Intersection Capacity Utilization		45.7%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	100	180	20	140	130	110	80	10	100	130	190
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	109	196	22	152	141	120	87	11	109	141	207
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	293			304			1005	870	207	755	897	223
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	293			304			1005	870	207	755	897	223
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	87			98			0	65	99	48	41	75
cM capacity (veh/h)	1268			1256			79	248	834	209	239	817
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total	163	304	22	293	120	98	109	348				
Volume Left	163	0	22	0	120	0	109	0				
Volume Right	0	196	0	141	0	11	0	207				
cSH	1268	1700	1256	1700	79	269	209	412				
Volume to Capacity	0.13	0.18	0.02	0.17	1.52	0.36	0.52	0.84				
Queue Length 95th (ft)	11	0	1	0	243	40	67	202				
Control Delay (s)	8.3	0.0	7.9	0.0	379.8	25.8	39.4	46.0				
Lane LOS	A		A		F	D	E	E				
Approach Delay (s)	2.9		0.5		220.5		44.4					
Approach LOS					F		E					
Intersection Summary												
Average Delay	47.9											
Intersection Capacity Utilization	61.5%			ICU Level of Service			B					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	200	90	100	630	700	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.97		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1725		1770	3539	3539	1583
Flt Permitted	0.97		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1725		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	220	99	110	692	769	440
RTOR Reduction (vph)	13	0	0	0	0	271
Lane Group Flow (vph)	306	0	110	692	769	169
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	19.3		8.1	41.4	28.3	28.3
Effective Green, g (s)	19.3		8.1	41.4	28.3	28.3
Actuated g/C Ratio	0.26		0.11	0.56	0.38	0.38
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	451		194	1985	1357	607
v/s Ratio Prot	c0.18		c0.06	0.20	c0.22	
v/s Ratio Perm						0.11
v/c Ratio	0.68		0.57	0.35	0.57	0.28
Uniform Delay, d1	24.5		31.2	8.8	17.9	15.7
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2		2.3	0.1	0.5	0.3
Delay (s)	27.7		33.4	8.9	18.5	16.0
Level of Service	C		C	A	B	B
Approach Delay (s)	27.7			12.3	17.6	
Approach LOS	C			B	B	

Intersection Summary

HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	73.8	Sum of lost time (s)	18.1
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

13: Honoapiilani Hwy & Waiale Rd

10/13/2014

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	310	0	930	110	0	710
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1770		1863	1583		1863
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1770		1863	1583		1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	337	0	1011	120	0	772
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	337	0	1011	120	0	772
Turn Type	NA	custom	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	14.4		35.1	57.5		35.1
Effective Green, g (s)	14.4		35.1	57.5		35.1
Actuated g/C Ratio	0.25		0.61	1.00		0.61
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	443		1137	1583		1137
v/s Ratio Prot			c0.54			0.41
v/s Ratio Perm	c0.19			0.08		
v/c Ratio	0.76		0.89	0.08		0.68
Uniform Delay, d1	20.0		9.5	0.0		7.5
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	7.5		8.7	0.1		1.6
Delay (s)	27.5		18.3	0.1		9.1
Level of Service	C		B	A		A
Approach Delay (s)	27.5		16.3			9.1
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			15.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.85			
Actuated Cycle Length (s)			57.5		Sum of lost time (s)	8.0
Intersection Capacity Utilization			72.8%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

14: Honoapiilani Hwy & Kuihelani Hwy

10/13/2014

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	10	10	10	760	10	10	10	770	710	10	940	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583	
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	11	11	11	809	11	11	11	819	755	11	1000	11	
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	0	7	
Lane Group Flow (vph)	0	22	0	413	407	11	11	819	755	11	1000	4	
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm	
Protected Phases	4	4		3	3		5	2		1	6		
Permitted Phases			4			Free			Free			6	
Actuated Green, G (s)		4.0	4.0	37.8	37.8	105.7	1.9	43.0	105.7	1.9	43.0	43.0	
Effective Green, g (s)		4.0	4.0	37.8	37.8	105.7	1.9	43.0	105.7	1.9	43.0	43.0	
Actuated g/C Ratio		0.04	0.04	0.36	0.36	1.00	0.02	0.41	1.00	0.02	0.41	0.41	
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0	
Lane Grp Cap (vph)		68	59	601	603	1583	31	1439	1583	31	1439	643	
v/s Ratio Prot		0.01		c0.25	0.24		0.01	0.23		0.01	c0.28		
v/s Ratio Perm			0.00			0.01			c0.48			0.00	
v/c Ratio		0.32	0.01	0.69	0.67	0.01	0.35	0.57	0.48	0.35	0.69	0.01	
Uniform Delay, d1		49.5	48.9	28.9	28.7	0.0	51.3	24.2	0.0	51.3	25.9	18.6	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.8	0.0	3.3	3.0	0.0	2.5	0.6	1.0	2.5	1.6	0.0	
Delay (s)		52.3	49.0	32.2	31.7	0.0	53.8	24.8	1.0	53.8	27.5	18.7	
Level of Service		D	D	C	C	A	D	C	A	D	C	B	
Approach Delay (s)		51.2			31.5			13.7			27.7		
Approach LOS		D			C			B			C		
Intersection Summary													
HCM 2000 Control Delay			22.4									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.73										
Actuated Cycle Length (s)			105.7									Sum of lost time (s)	19.0
Intersection Capacity Utilization			64.0%									ICU Level of Service	B
Analysis Period (min)			15										
c Critical Lane Group													

LOS Worksheets – Year 2026 with Project Conditions

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↑	↗	↖	↑	↗
Volume (vph)	40	210	81	303	150	320	61	572	439	460	592	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1848	1550		1801	1583	1770	1863	1547	1770	1863	1583
Flt Permitted		0.59	1.00		0.51	1.00	0.21	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1091	1550		954	1583	385	1863	1547	166	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	236	91	340	169	360	69	643	493	517	665	11
RTOR Reduction (vph)	0	0	58	0	0	164	0	0	219	0	0	6
Lane Group Flow (vph)	0	281	33	0	509	196	69	643	274	517	665	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.0	40.0		40.0	40.0	46.3	40.8	40.8	59.8	50.3	50.3
Effective Green, g (s)		40.0	40.0		40.0	40.0	46.3	40.8	40.8	59.8	50.3	50.3
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.42	0.37	0.37	0.54	0.46	0.46
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		397	564		347	576	231	692	574	309	853	725
v/s Ratio Prot							0.01	0.35		0.23	0.36	
v/s Ratio Perm		0.26	0.02		0.53	0.12	0.11		0.18	0.68		0.00
v/c Ratio		0.71	0.06		1.47	0.34	0.30	0.93	0.48	1.67	0.78	0.01
Uniform Delay, d1		29.9	22.7		34.9	25.3	21.2	33.1	26.3	33.9	25.1	16.2
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		5.3	0.0		225.3	0.3	0.3	19.5	1.3	316.8	5.3	0.0
Delay (s)		35.2	22.7		260.2	25.6	21.4	52.6	27.7	350.7	30.4	16.2
Level of Service		D	C		F	C	C	D	C	F	C	B
Approach Delay (s)		32.1			163.0			40.6			169.1	
Approach LOS		C			F			D			F	
Intersection Summary												
HCM 2000 Control Delay		111.1										
HCM 2000 Volume to Capacity ratio		1.63										
Actuated Cycle Length (s)		109.8										
Intersection Capacity Utilization		109.4%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	667	70	171	453	400	140	587	262	250	244	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1832		1770	1863	1538	1770	1760		1770	1748	
Flt Permitted	0.09	1.00		0.10	1.00	1.00	0.27	1.00		0.09	1.00	
Satd. Flow (perm)	172	1832		195	1863	1538	495	1760		165	1748	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	388	695	73	178	472	417	146	611	273	260	254	177
RTOR Reduction (vph)	0	3	0	0	0	135	0	11	0	0	18	0
Lane Group Flow (vph)	388	765	0	178	472	282	146	873	0	260	413	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	70.4	51.0		52.6	38.2	38.2	48.0	40.1		58.1	45.2	
Effective Green, g (s)	70.4	51.0		52.6	38.2	38.2	48.0	40.1		58.1	45.2	
Actuated g/C Ratio	0.51	0.37		0.38	0.28	0.28	0.35	0.29		0.42	0.33	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	401	674		237	513	424	244	509		219	570	
v/s Ratio Prot	c0.19	c0.42		0.08	0.25		0.03	c0.50		c0.11	0.24	
v/s Ratio Perm	0.30			0.21		0.18	0.17			0.38		
v/c Ratio	0.97	1.14		0.75	0.92	0.66	0.60	1.71		1.19	0.73	
Uniform Delay, d1	43.4	43.8		34.3	48.7	44.5	34.2	49.2		40.9	41.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	35.9	78.5		11.2	21.9	3.9	2.6	329.8		120.6	4.6	
Delay (s)	79.3	122.2		45.5	70.6	48.4	36.9	379.0		161.5	45.7	
Level of Service	E	F		D	E	D	D	F		F	D	
Approach Delay (s)		107.8			57.7			330.5			89.3	
Approach LOS		F			E			F			F	
Intersection Summary												
HCM 2000 Control Delay	149.2			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.34											
Actuated Cycle Length (s)	138.5			Sum of lost time (s)					20.0			
Intersection Capacity Utilization	126.3%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	189	490	160	70	488	230	250	653	80	120	503	195
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
Hourly flow rate (vph)	199	516	168	74	514	242	263	687	84	126	529	205
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total (vph)	883	829	263	772	126	735						
Volume Left (vph)	199	74	263	0	126	0						
Volume Right (vph)	168	242	0	84	0	205						
Hadj (s)	-0.04	-0.12	0.53	-0.04	0.53	-0.16						
Departure Headway (s)	9.4	9.3	10.2	9.6	10.2	9.5						
Degree Utilization, x	2.31	2.15	0.74	2.05	0.36	1.93						
Capacity (veh/h)	390	393	349	382	351	386						
Control Delay (s)	618.8	547.3	36.2	503.9	17.5	449.6						
Approach Delay (s)	618.8	547.3	385.0		386.2							
Approach LOS	F	F	F		F							
Intersection Summary												
Delay			479.8									
Level of Service			F									
Intersection Capacity Utilization			151.3%	ICU Level of Service		H						
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	910	0	50	0	0	0	110	1335	0	0	940	668
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0			7.0	7.0
Lane Util. Factor		1.00					1.00	0.95			0.95	1.00
Frt		0.99					1.00	1.00			1.00	0.85
Flt Protected		0.95					0.95	1.00			1.00	1.00
Satd. Flow (prot)		1766					1770	3539			3539	1583
Flt Permitted		0.95					0.95	1.00			1.00	1.00
Satd. Flow (perm)		1766					1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	948	0	52	0	0	0	115	1391	0	0	979	696
RTOR Reduction (vph)	0	52	0	0	0	0	0	0	0	0	0	362
Lane Group Flow (vph)	0	948	0	0	0	0	115	1391	0	0	979	334
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.7					12.1	73.1			56.0	56.0
Effective Green, g (s)		30.7					12.1	73.1			56.0	56.0
Actuated g/C Ratio		0.26					0.10	0.63			0.48	0.48
Clearance Time (s)		6.0					5.0	7.0			7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0			5.0	5.0
Lane Grp Cap (vph)		464					183	2214			1696	758
v/s Ratio Prot							0.06	c0.39			0.28	
v/s Ratio Perm		0.54										0.21
v/c Ratio		2.04					0.63	0.63			0.58	0.44
Uniform Delay, d1		43.0					50.2	13.5			21.9	20.1
Progression Factor		1.00					1.00	1.00			1.00	1.00
Incremental Delay, d2		477.3					4.8	0.8			0.8	0.9
Delay (s)		520.3					55.0	14.3			22.6	20.9
Level of Service		F					D	B			C	C
Approach Delay (s)		520.3			0.0			17.4			21.9	
Approach LOS		F			A			B			C	
Intersection Summary												
HCM 2000 Control Delay		139.5					HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio		1.10										
Actuated Cycle Length (s)		116.8					Sum of lost time (s)			18.0		
Intersection Capacity Utilization		108.7%					ICU Level of Service			G		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Honoapiilani Hwy & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	120	11	59	60	60	11	911	90	200	816	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1856	1547		1725		1770	1838		1770	1863	1547
Flt Permitted		0.96	1.00		0.73		0.22	1.00		0.05	1.00	1.00
Satd. Flow (perm)		1783	1547		1271		410	1838		97	1863	1547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	11	136	12	67	68	68	12	1035	102	227	927	11
RTOR Reduction (vph)	0	0	10	0	15	0	0	2	0	0	0	3
Lane Group Flow (vph)	0	147	2	0	188	0	12	1135	0	227	927	8
Confl. Peds. (#/hr)	1		1	1		1	1					1
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		19.7	19.7		20.2		74.7	72.8		90.0	84.1	84.1
Effective Green, g (s)		19.7	19.7		20.2		74.7	72.8		90.0	84.1	84.1
Actuated g/C Ratio		0.16	0.16		0.17		0.61	0.60		0.74	0.69	0.69
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		287	249		210		271	1094		252	1282	1064
v/s Ratio Prot							0.00	c0.62		c0.10	0.50	
v/s Ratio Perm		0.08	0.00		c0.15		0.03			0.57		0.00
v/c Ratio		0.51	0.01		0.90		0.04	1.04		0.90	0.72	0.01
Uniform Delay, d1		46.9	43.0		50.0		11.5	24.7		42.9	11.8	6.0
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.6	0.0		34.1		0.0	37.3		31.3	2.5	0.0
Delay (s)		47.5	43.0		84.0		11.6	62.0		74.2	14.3	6.0
Level of Service		D	D		F		B	E		E	B	A
Approach Delay (s)		47.2			84.0			61.5			25.9	
Approach LOS		D			F			E			C	
Intersection Summary												
HCM 2000 Control Delay		46.9										
HCM 2000 Volume to Capacity ratio		1.00										
Actuated Cycle Length (s)		122.2								16.5		
Intersection Capacity Utilization		94.7%								F		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Waiko Rd & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	383	20	159	162	360	10	418	205	290	210	17
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
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)	1752	1846		1759	1863	1532	1753	1863	1532	1759	1834	
Flt Permitted	0.65	1.00		0.33	1.00	1.00	0.60	1.00	1.00	0.41	1.00	
Satd. Flow (perm)	1191	1846		608	1863	1532	1116	1863	1532	754	1834	
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	0.82
Adj. Flow (vph)	30	416	22	173	176	391	11	454	223	315	228	21
RTOR Reduction (vph)	0	4	0	0	0	197	0	0	116	0	7	0
Lane Group Flow (vph)	30	434	0	173	176	194	11	454	107	315	242	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	16.2	16.2		16.2	16.2	16.2	22.3	22.3	22.3	22.3	22.3	
Effective Green, g (s)	16.2	16.2		16.2	16.2	16.2	22.3	22.3	22.3	22.3	22.3	
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.35	0.48	0.48	0.48	0.48	0.48	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	414	643		211	649	533	535	893	734	361	879	
v/s Ratio Prot		0.24			0.09			0.24			0.13	
v/s Ratio Perm	0.03			c0.28		0.13	0.01		0.07	c0.42		
v/c Ratio	0.07	0.68		0.82	0.27	0.36	0.02	0.51	0.15	0.87	0.28	
Uniform Delay, d1	10.1	12.9		13.8	10.9	11.3	6.4	8.3	6.8	10.8	7.3	
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	2.8		21.4	0.2	0.4	0.0	0.5	0.1	20.0	0.2	
Delay (s)	10.2	15.7		35.2	11.1	11.7	6.4	8.8	6.9	30.9	7.4	
Level of Service	B	B		D	B	B	A	A	A	C	A	
Approach Delay (s)		15.4			17.1			8.1			20.5	
Approach LOS		B			B			A			C	
Intersection Summary												
HCM 2000 Control Delay			15.0									
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			46.5									
Intersection Capacity Utilization			81.6%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	280	232	160	10	132	50	259	180	10	100	90	206
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	252	174	11	143	54	282	196	11	109	98	224
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	198			426			1386	1167	339	1162	1227	171
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	198			426			1386	1167	339	1162	1227	171
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			99			0	0	98	0	29	74
cM capacity (veh/h)	1375			1133			32	149	703	0	137	873
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total	304	426	11	198	282	207	109	322				
Volume Left	304	0	11	0	282	0	109	0				
Volume Right	0	174	0	54	0	11	0	224				
cSH	1375	1700	1133	1700	32	156	0	332				
Volume to Capacity	0.22	0.25	0.01	0.12	8.77	1.33	Err	0.97				
Queue Length 95th (ft)	21	0	1	0	Err	313	Err	259				
Control Delay (s)	8.4	0.0	8.2	0.0	Err	240.2	Err	77.7				
Lane LOS	A		A		F	F	F	F				
Approach Delay (s)	3.5		0.4		5869.4		Err					
Approach LOS					F		F					
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			70.6%		ICU Level of Service			C				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	575	180	90	600	570	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1737		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1737		1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	639	200	100	667	633	300
RTOR Reduction (vph)	7	0	0	0	0	214
Lane Group Flow (vph)	832	0	100	667	633	86
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	32.5		7.8	36.2	23.4	23.4
Effective Green, g (s)	32.5		7.8	36.2	23.4	23.4
Actuated g/C Ratio	0.40		0.10	0.44	0.29	0.29
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	690		168	1566	1012	452
v/s Ratio Prot	c0.48		c0.06	0.19	c0.18	
v/s Ratio Perm						0.05
v/c Ratio	1.21		0.60	0.43	0.63	0.19
Uniform Delay, d1	24.6		35.5	15.7	25.4	22.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	106.2		3.7	0.2	1.2	0.2
Delay (s)	130.8		39.2	15.8	26.6	22.2
Level of Service	F		D	B	C	C
Approach Delay (s)	130.8			18.9	25.2	
Approach LOS	F			B	C	

Intersection Summary

HCM 2000 Control Delay	58.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	81.8	Sum of lost time (s)	18.1
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Honoapiilani Hwy & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	30	38	31	22	54	30	899	33	50	910	55
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1758	1683		1760	1632		1768	1863	1539	1768	1863	1539
Flt Permitted	0.70	1.00		0.71	1.00		0.17	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1301	1683		1313	1632		316	1863	1539	328	1863	1539
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)	117	33	41	34	24	59	33	977	36	54	989	60
RTOR Reduction (vph)	0	34	0	0	49	0	0	0	11	0	0	18
Lane Group Flow (vph)	117	40	0	34	34	0	33	977	25	54	989	42
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.9	9.9		9.9	9.9		40.3	40.3	40.3	40.3	40.3	40.3
Effective Green, g (s)	9.9	9.9		9.9	9.9		40.3	40.3	40.3	40.3	40.3	40.3
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.69	0.69	0.69	0.69	0.69	0.69
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	221	286		223	277		218	1290	1065	227	1290	1065
v/s Ratio Prot		0.02			0.02			0.52			c0.53	
v/s Ratio Perm	c0.09			0.03			0.10		0.02	0.16		0.03
v/c Ratio	0.53	0.14		0.15	0.12		0.15	0.76	0.02	0.24	0.77	0.04
Uniform Delay, d1	22.0	20.5		20.6	20.5		3.1	5.8	2.8	3.3	5.9	2.8
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	2.3	0.2		0.3	0.2		0.3	2.6	0.0	0.5	2.8	0.0
Delay (s)	24.3	20.8		20.9	20.7		3.4	8.4	2.8	3.8	8.7	2.8
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		22.9			20.7			8.0			8.1	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

10: Waiale Rd & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	90	0	24	10	0	10	24	474	10	90	164	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	0	26	11	0	11	26	515	11	98	178	60
Approach Volume (veh/h)	124			22			552			336		
Crossing Volume (veh/h)	287			639			196			37		
High Capacity (veh/h)	1106			835			1188			1345		
High v/c (veh/h)	0.11			0.03			0.46			0.25		
Low Capacity (veh/h)	908			667			983			1125		
Low v/c (veh/h)	0.14			0.03			0.56			0.30		
Intersection Summary												
Maximum v/c High	0.46											
Maximum v/c Low	0.56											
Intersection Capacity Utilization	63.8%			ICU Level of Service			B					

HCM 2010 Roundabout
10: Waiale Rd & Main Street

10/13/2014

Intersection				
Intersection Delay, s/veh	9.9			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	124	22	552	336
Demand Flow Rate, veh/h	127	22	563	343
Vehicles Circulating, veh/h	293	652	200	38
Vehicles Exiting, veh/h	88	111	220	636
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	6.5	13.0	6.5
Approach LOS	A	A	B	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	127	22	563	343
Cap Entry Lane, veh/h	843	589	925	1088
Entry HV Adj Factor	0.976	1.000	0.980	0.981
Flow Entry, veh/h	124	22	552	336
Cap Entry, veh/h	823	589	907	1067
V/C Ratio	0.151	0.037	0.609	0.315
Control Delay, s/veh	5.9	6.5	13.0	6.5
LOS	A	A	B	A
95th %tile Queue, veh	1	0	4	1

HCM Signalized Intersection Capacity Analysis

11: Honoapiilani Hwy & East-West Residential St

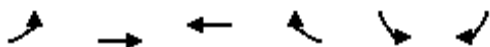
10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	6	24	15	1	25	9	852	7	8	934	38
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1756	1608		1758	1551		1770	1863	1538	1767	1863	1538
Flt Permitted	0.74	1.00		0.74	1.00		0.17	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1366	1608		1362	1551		324	1863	1538	407	1863	1538
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)	93	7	26	16	1	27	10	926	8	9	1015	41
RTOR Reduction (vph)	0	22	0	0	23	0	0	0	2	0	0	11
Lane Group Flow (vph)	93	11	0	16	5	0	10	926	6	9	1015	30
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.3	9.3		9.3	9.3		44.4	44.4	44.4	44.4	44.4	44.4
Effective Green, g (s)	9.3	9.3		9.3	9.3		44.4	44.4	44.4	44.4	44.4	44.4
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.72	0.72	0.72	0.72	0.72	0.72
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	205	242		205	233		233	1340	1106	292	1340	1106
v/s Ratio Prot		0.01			0.00			0.50			c0.54	
v/s Ratio Perm	c0.07			0.01			0.03		0.00	0.02		0.02
v/c Ratio	0.45	0.05		0.08	0.02		0.04	0.69	0.01	0.03	0.76	0.03
Uniform Delay, d1	23.9	22.4		22.5	22.3		2.5	4.8	2.4	2.5	5.3	2.5
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	1.6	0.1		0.2	0.0		0.1	1.6	0.0	0.0	2.5	0.0
Delay (s)	25.5	22.5		22.7	22.4		2.6	6.4	2.4	2.5	7.8	2.5
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		24.7			22.5			6.3			7.6	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.3										
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		61.7										
Intersection Capacity Utilization		68.4%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

12: Waiale Rd & North-South Residential St

10/13/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	28	374	148	51	133	77
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	407	161	55	145	84
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1047				
pX, platoon unblocked						
vC, conflicting volume	216				656	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	216				656	189
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				66	90
cM capacity (veh/h)	1353				421	853
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	437	216	228			
Volume Left	30	0	145			
Volume Right	0	55	84			
cSH	1353	1700	517			
Volume to Capacity	0.02	0.13	0.44			
Queue Length 95th (ft)	2	0	56			
Control Delay (s)	0.8	0.0	17.4			
Lane LOS	A		C			
Approach Delay (s)	0.8	0.0	17.4			
Approach LOS			C			
Intersection Summary						
Average Delay			4.9			
Intersection Capacity Utilization			54.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

13: Honoapiilani Hwy & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	16	6	199	5	20	2	830	381	6	955	11
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1781		1770	1604		1770	1863	1550	1770	1863	1583
Flt Permitted	0.93	1.00		0.48	1.00		0.11	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1733	1781		898	1604		202	1863	1550	345	1863	1583
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)	18	17	7	216	5	22	2	902	414	7	1038	12
RTOR Reduction (vph)	0	7	0	0	18	0	0	0	0	0	0	4
Lane Group Flow (vph)	18	17	0	216	9	0	2	902	414	7	1038	8
Confl. Peds. (#/hr)						2			2			
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Free	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2		Free	6		6
Actuated Green, G (s)	4.9	4.3		16.5	11.9		46.9	46.9	71.4	46.9	46.9	46.9
Effective Green, g (s)	4.9	4.3		16.5	11.9		46.9	46.9	71.4	46.9	46.9	46.9
Actuated g/C Ratio	0.07	0.06		0.23	0.17		0.66	0.66	1.00	0.66	0.66	0.66
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)	119	107		307	267		132	1223	1550	226	1223	1039
v/s Ratio Prot	0.00	0.01		c0.08	0.01			0.48			c0.56	
v/s Ratio Perm	0.01			c0.08			0.01		0.27	0.02		0.00
v/c Ratio	0.15	0.16		0.70	0.03		0.02	0.74	0.27	0.03	0.85	0.01
Uniform Delay, d1	31.3	31.8		24.2	24.9		4.2	8.2	0.0	4.3	9.5	4.2
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	0.6	0.7		7.1	0.0		0.0	2.4	0.4	0.1	5.7	0.0
Delay (s)	31.9	32.6		31.3	25.0		4.3	10.5	0.4	4.3	15.2	4.2
Level of Service	C	C		C	C		A	B	A	A	B	A
Approach Delay (s)		32.3			30.6			7.3			15.0	
Approach LOS		C			C			A			B	

Intersection Summary

HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Honoapiilani Hwy & Kuihelani Hwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗
Volume (vph)	10	10	10	740	10	10	10	1124	700	10	971	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1817	1583	1681	1687	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	10	10	771	10	10	10	1171	729	10	1011	10
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0	5
Lane Group Flow (vph)	0	20	0	393	388	10	10	1171	729	10	1011	5
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4			Free			Free			6
Actuated Green, G (s)		3.9	3.9	37.8	37.8	114.3	1.9	51.7	114.3	1.9	51.7	51.7
Effective Green, g (s)		3.9	3.9	37.8	37.8	114.3	1.9	51.7	114.3	1.9	51.7	51.7
Actuated g/C Ratio		0.03	0.03	0.33	0.33	1.00	0.02	0.45	1.00	0.02	0.45	0.45
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)		61	54	555	557	1583	29	1600	1583	29	1600	716
v/s Ratio Prot		0.01		c0.23	0.23		0.01	c0.33		0.01	0.29	
v/s Ratio Perm			0.00			0.01			c0.46			0.00
v/c Ratio		0.33	0.01	0.71	0.70	0.01	0.34	0.73	0.46	0.34	0.63	0.01
Uniform Delay, d1		53.9	53.3	33.4	33.3	0.0	55.6	25.6	0.0	55.6	24.0	17.2
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.1	0.0	4.1	3.8	0.0	2.6	1.9	1.0	2.6	0.9	0.0
Delay (s)		57.1	53.4	37.5	37.0	0.0	58.2	27.5	1.0	58.2	24.9	17.2
Level of Service		E	D	D	D	A	E	C	A	E	C	B
Approach Delay (s)		55.8			36.8			17.5			25.2	
Approach LOS		E			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			24.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			114.3			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			66.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	100	32	367	170	410	73	596	336	400	640	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1847	1583		1801	1526	1770	1863	1583	1770	1863	1583
Flt Permitted		0.63	1.00		0.71	1.00	0.18	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1172	1583		1321	1526	329	1863	1583	167	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	108	34	395	183	441	78	641	361	430	688	43
RTOR Reduction (vph)	0	0	22	0	0	177	0	0	227	0	0	23
Lane Group Flow (vph)	0	130	12	0	578	264	78	641	134	430	688	20
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		40.0	40.0		40.0	40.0	46.4	40.6	40.6	59.6	49.8	49.8
Effective Green, g (s)		40.0	40.0		40.0	40.0	46.4	40.6	40.6	59.6	49.8	49.8
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.42	0.37	0.37	0.54	0.45	0.45
Clearance Time (s)		5.0	5.0		5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		427	577		482	556	215	690	586	310	846	719
v/s Ratio Prot							0.02	0.34		0.19	0.37	
v/s Ratio Perm		0.11	0.01		0.44	0.17	0.13		0.08	0.56		0.01
v/c Ratio		0.30	0.02		1.20	0.47	0.36	0.93	0.23	1.39	0.81	0.03
Uniform Delay, d1		24.9	22.3		34.8	26.7	21.7	33.1	23.7	33.9	25.9	16.5
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		0.3	0.0		108.2	0.5	0.4	19.5	0.4	193.0	6.8	0.0
Delay (s)		25.2	22.3		143.0	27.2	22.1	52.6	24.1	226.8	32.7	16.6
Level of Service		C	C		F	C	C	D	C	F	C	B
Approach Delay (s)		24.6			92.9			40.9			104.0	
Approach LOS		C			F			D			F	
Intersection Summary												
HCM 2000 Control Delay		77.0										
HCM 2000 Volume to Capacity ratio		1.35										
Actuated Cycle Length (s)		109.6										
Intersection Capacity Utilization		101.1%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	506	80	215	720	400	30	287	157	360	526	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1818		1770	1863	1583	1770	1750		1770	1790	
Flt Permitted	0.10	1.00		0.10	1.00	1.00	0.11	1.00		0.15	1.00	
Satd. Flow (perm)	185	1818		181	1863	1583	196	1750		271	1790	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	522	82	222	742	412	31	296	162	371	542	152
RTOR Reduction (vph)	0	4	0	0	0	214	0	14	0	0	7	0
Lane Group Flow (vph)	205	600	0	222	742	198	31	444	0	371	687	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	55.3	40.3		57.1	41.2	41.2	41.7	38.0		56.1	47.4	
Effective Green, g (s)	55.3	40.3		57.1	41.2	41.2	41.7	38.0		56.1	47.4	
Actuated g/C Ratio	0.43	0.32		0.45	0.32	0.32	0.33	0.30		0.44	0.37	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	267	575		279	602	512	109	522		273	666	
v/s Ratio Prot	0.09	0.33		c0.10	c0.40		0.01	0.25		c0.14	0.38	
v/s Ratio Perm	0.24			0.26		0.12	0.08			c0.46		
v/c Ratio	0.77	1.04		0.80	1.23	0.39	0.28	0.85		1.36	1.03	
Uniform Delay, d1	31.4	43.5		33.1	43.0	33.3	33.9	42.0		28.9	40.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.3	49.3		13.6	118.6	0.5	0.5	12.6		183.5	43.3	
Delay (s)	42.6	92.8		46.7	161.7	33.8	34.4	54.5		212.4	83.2	
Level of Service	D	F		D	F	C	C	D		F	F	
Approach Delay (s)		80.1			104.8			53.3			128.2	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM 2000 Control Delay	99.4			HCM 2000 Level of Service			F					
HCM 2000 Volume to Capacity ratio	1.27											
Actuated Cycle Length (s)	127.3			Sum of lost time (s)			20.0					
Intersection Capacity Utilization	110.2%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	271	523	170	30	555	90	130	410	40	100	503	351
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
Hourly flow rate (vph)	277	534	173	31	566	92	133	418	41	102	513	358
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total (vph)	984	689	133	459	102	871						
Volume Left (vph)	277	31	133	0	102	0						
Volume Right (vph)	173	92	0	41	0	358						
Hadj (s)	-0.02	-0.04	0.53	-0.03	0.53	-0.25						
Departure Headway (s)	9.4	9.4	10.2	9.6	10.2	9.4						
Degree Utilization, x	2.58	1.80	0.37	1.22	0.29	2.27						
Capacity (veh/h)	391	387	351	380	350	392						
Control Delay (s)	738.6	393.6	17.9	150.5	16.0	598.8						
Approach Delay (s)	738.6	393.6	120.8		537.7							
Approach LOS	F	F	F		F							
Intersection Summary												
Delay			491.9									
Level of Service			F									
Intersection Capacity Utilization			157.7%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	743	0	10	0	0	0	70	947	0	10	1405	965
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	1.00
Frt		1.00					1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1772					1770	3539		1770	3539	1550
Flt Permitted		0.95					0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1772					1770	3539		1770	3539	1550
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)	808	0	11	0	0	0	76	1029	0	11	1527	1049
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	396
Lane Group Flow (vph)	0	765	0	0	0	0	76	1029	0	11	1527	653
Confl. Peds. (#/hr)												1
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4					5	2		1	6	
Permitted Phases	4											6
Actuated Green, G (s)		30.1					8.5	80.4		1.3	73.2	73.2
Effective Green, g (s)		30.1					8.5	80.4		1.3	73.2	73.2
Actuated g/C Ratio		0.23					0.07	0.62		0.01	0.56	0.56
Clearance Time (s)		6.0					5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)		2.0					2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		410					115	2192		17	1995	874
v/s Ratio Prot							c0.04	0.29		0.01	c0.43	
v/s Ratio Perm		0.43										0.42
v/c Ratio		1.87					0.66	0.47		0.65	0.77	0.75
Uniform Delay, d1		49.9					59.2	13.3		64.0	21.7	21.3
Progression Factor		1.00					1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		399.1					10.5	0.3		49.2	2.1	4.2
Delay (s)		449.0					69.7	13.6		113.2	23.8	25.6
Level of Service		F					E	B		F	C	C
Approach Delay (s)		449.0			0.0			17.5			24.9	
Approach LOS		F			A			B			C	
Intersection Summary												
HCM 2000 Control Delay		100.1					HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio		1.05										
Actuated Cycle Length (s)		129.8					Sum of lost time (s)			18.0		
Intersection Capacity Utilization		99.5%					ICU Level of Service			F		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Honoapiilani Hwy & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	50	12	103	90	120	13	854	77	80	860	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		0.99		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1847	1583		1713		1770	1835		1770	1863	1542
Flt Permitted		0.88	1.00		0.86		0.16	1.00		0.07	1.00	1.00
Satd. Flow (perm)		1645	1583		1506		303	1835		124	1863	1542
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)	11	54	13	112	98	130	14	928	84	87	935	11
RTOR Reduction (vph)	0	0	10	0	17	0	0	2	0	0	0	4
Lane Group Flow (vph)	0	65	3	0	323	0	14	1010	0	87	935	7
Confl. Peds. (#/hr)	1					1	2		5	5		2
Confl. Bikes (#/hr)						8						
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		24.5	24.5		25.0		74.5	72.5		83.3	77.3	77.3
Effective Green, g (s)		24.5	24.5		25.0		74.5	72.5		83.3	77.3	77.3
Actuated g/C Ratio		0.20	0.20		0.21		0.62	0.60		0.69	0.64	0.64
Clearance Time (s)		6.5	6.5		6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		2.0	2.0		2.0		2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)		335	322		312		212	1105		178	1197	990
v/s Ratio Prot							0.00	c0.55		c0.03	c0.50	
v/s Ratio Perm		0.04	0.00		c0.21		0.04			0.31		0.00
v/c Ratio		0.19	0.01		1.03		0.07	0.91		0.49	0.78	0.01
Uniform Delay, d1		39.7	38.2		47.6		14.2	21.1		23.4	15.4	7.7
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		60.0		0.0	12.0		0.8	3.9	0.0
Delay (s)		39.8	38.2		107.6		14.3	33.1		24.1	19.4	7.7
Level of Service		D	D		F		B	C		C	B	A
Approach Delay (s)		39.6			107.6			32.9			19.6	
Approach LOS		D			F			C			B	
Intersection Summary												
HCM 2000 Control Delay			37.8				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			120.3				Sum of lost time (s)			16.5		
Intersection Capacity Utilization			91.9%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Waiko Rd & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	186	10	207	265	240	20	220	185	260	402	37
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
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)	1758	1845		1756	1863	1536	1761	1863	1536	1757	1835	
Flt Permitted	0.57	1.00		0.62	1.00	1.00	0.37	1.00	1.00	0.61	1.00	
Satd. Flow (perm)	1051	1845		1155	1863	1536	686	1863	1536	1128	1835	
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)	23	202	11	225	288	261	22	239	201	283	437	40
RTOR Reduction (vph)	0	4	0	0	0	165	0	0	118	0	8	0
Lane Group Flow (vph)	23	209	0	225	288	96	22	239	83	283	469	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	13.2	13.2		13.2	13.2	13.2	14.8	14.8	14.8	14.8	14.8	
Effective Green, g (s)	13.2	13.2		13.2	13.2	13.2	14.8	14.8	14.8	14.8	14.8	
Actuated g/C Ratio	0.37	0.37		0.37	0.37	0.37	0.41	0.41	0.41	0.41	0.41	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	385	676		423	683	563	282	765	631	463	754	
v/s Ratio Prot		0.11			0.15			0.13			c0.26	
v/s Ratio Perm	0.02			c0.19		0.06	0.03		0.05	0.25		
v/c Ratio	0.06	0.31		0.53	0.42	0.17	0.08	0.31	0.13	0.61	0.62	
Uniform Delay, d1	7.4	8.1		9.0	8.5	7.7	6.4	7.2	6.6	8.3	8.4	
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	0.1	0.3		1.3	0.4	0.1	0.1	0.2	0.1	2.4	1.6	
Delay (s)	7.4	8.4		10.3	9.0	7.8	6.6	7.4	6.7	10.7	10.0	
Level of Service	A	A		B	A	A	A	A	A	B	A	
Approach Delay (s)		8.3			9.0			7.1			10.3	
Approach LOS		A			A			A			B	
Intersection Summary												
HCM 2000 Control Delay		8.9										
HCM 2000 Volume to Capacity ratio		0.58										
Actuated Cycle Length (s)		36.0										
Intersection Capacity Utilization		63.5%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	196	151	198	20	222	130	135	80	10	100	130	257
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	213	164	215	22	241	141	147	87	11	109	141	279
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	383			379			1333	1124	272	1000	1161	312
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	383			379			1333	1124	272	1000	1161	312
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			98			0	47	99	2	10	62
cM capacity (veh/h)	1176			1179			16	165	767	110	157	728
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total	213	379	22	383	147	98	109	421				
Volume Left	213	0	22	0	147	0	109	0				
Volume Right	0	215	0	141	0	11	0	279				
cSH	1176	1700	1179	1700	16	181	110	328				
Volume to Capacity	0.18	0.22	0.02	0.23	9.27	0.54	0.98	1.28				
Queue Length 95th (ft)	17	0	1	0	Err	70	157	491				
Control Delay (s)	8.7	0.0	8.1	0.0	Err	46.2	154.4	182.0				
Lane LOS	A		A		F	E	F	F				
Approach Delay (s)	3.1		0.4		6017.9		176.4					
Approach LOS					F		F					
Intersection Summary												
Average Delay			885.1									
Intersection Capacity Utilization			73.9%		ICU Level of Service			D				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	247	90	100	630	700	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8		5.0	6.3	6.3	6.3
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1732		1770	3539	3539	1583
Flt Permitted	0.96		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1732		1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	271	99	110	692	769	522
RTOR Reduction (vph)	9	0	0	0	0	333
Lane Group Flow (vph)	361	0	110	692	769	189
Turn Type	NA		Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Actuated Green, G (s)	22.9		10.2	44.3	29.1	29.1
Effective Green, g (s)	22.9		10.2	44.3	29.1	29.1
Actuated g/C Ratio	0.29		0.13	0.55	0.36	0.36
Clearance Time (s)	6.8		5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	493		224	1952	1282	573
v/s Ratio Prot	c0.21		c0.06	0.20	c0.22	
v/s Ratio Perm						0.12
v/c Ratio	0.73		0.49	0.35	0.60	0.33
Uniform Delay, d1	25.9		32.6	10.0	20.9	18.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.8		0.6	0.1	0.8	0.3
Delay (s)	30.7		33.3	10.1	21.6	18.9
Level of Service	C		C	B	C	B
Approach Delay (s)	30.7			13.3	20.5	
Approach LOS	C			B	C	

Intersection Summary

HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.3	Sum of lost time (s)	18.1
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Honoapiilani Hwy & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	117	41	59	31	42	69	64	980	32	74	803	147
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1756	1671		1758	1659		1767	1863	1536	1770	1863	1536
Flt Permitted	0.67	1.00		0.69	1.00		0.23	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	1243	1671		1271	1659		422	1863	1536	235	1863	1536
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)	127	45	64	34	46	75	70	1065	35	80	873	160
RTOR Reduction (vph)	0	52	0	0	61	0	0	0	11	0	0	49
Lane Group Flow (vph)	127	57	0	34	60	0	70	1065	24	80	873	111
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.7	13.7		13.7	13.7		49.5	49.5	49.5	49.5	49.5	49.5
Effective Green, g (s)	13.7	13.7		13.7	13.7		49.5	49.5	49.5	49.5	49.5	49.5
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.70	0.70	0.70	0.70	0.70	0.70
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	239	321		244	319		293	1295	1067	163	1295	1067
v/s Ratio Prot		0.03			0.04			c0.57			0.47	
v/s Ratio Perm	c0.10			0.03			0.17		0.02	0.34		0.07
v/c Ratio	0.53	0.18		0.14	0.19		0.24	0.82	0.02	0.49	0.67	0.10
Uniform Delay, d1	25.9	24.0		23.9	24.1		4.0	7.7	3.4	5.0	6.2	3.6
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	2.3	0.3		0.3	0.3		0.4	4.3	0.0	2.3	1.4	0.0
Delay (s)	28.1	24.3		24.1	24.4		4.4	12.1	3.4	7.3	7.6	3.6
Level of Service	C	C		C	C		A	B	A	A	A	A
Approach Delay (s)		26.4			24.3			11.3			7.0	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay		11.6					HCM 2000 Level of Service		B			
HCM 2000 Volume to Capacity ratio		0.76										
Actuated Cycle Length (s)		71.2					Sum of lost time (s)		8.0			
Intersection Capacity Utilization		79.8%					ICU Level of Service		D			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

10: Waiale Rd & Main Street

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	149	0	65	10	0	90	66	170	10	10	413	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	162	0	71	11	0	98	72	185	11	11	449	183
Approach Volume (veh/h)	233			109			267			642		
Crossing Volume (veh/h)	471			418			173			83		
High Capacity (veh/h)	956			996			1210			1298		
High v/c (veh/h)	0.24			0.11			0.22			0.49		
Low Capacity (veh/h)	774			810			1002			1083		
Low v/c (veh/h)	0.30			0.13			0.27			0.59		
Intersection Summary												
Maximum v/c High	0.49											
Maximum v/c Low	0.59											
Intersection Capacity Utilization	74.6%			ICU Level of Service			D					

HCM 2010 Roundabout
10: Waiale Rd & Main Street

10/13/2014

Intersection				
Intersection Delay, s/veh	10.3			
Intersection LOS	B			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	233	109	268	643
Demand Flow Rate, veh/h	237	111	273	656
Vehicles Circulating, veh/h	480	427	176	84
Vehicles Exiting, veh/h	260	22	541	454
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.6	6.6	6.9	12.5
Approach LOS	A	A	A	B
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	237	111	273	656
Cap Entry Lane, veh/h	699	737	948	1039
Entry HV Adj Factor	0.983	0.982	0.983	0.980
Flow Entry, veh/h	233	109	268	643
Cap Entry, veh/h	687	724	931	1018
V/C Ratio	0.339	0.151	0.288	0.631
Control Delay, s/veh	9.6	6.6	6.9	12.5
LOS	A	A	A	B
95th %tile Queue, veh	1	1	1	5

HCM Signalized Intersection Capacity Analysis

11: Honoapiilani Hwy & East-West Residential St

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	4	13	12	7	14	23	1014	17	24	792	76
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1755	1611		1757	1650		1766	1863	1537	1770	1863	1537
Flt Permitted	0.74	1.00		0.75	1.00		0.28	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1372	1611		1379	1650		520	1863	1537	319	1863	1537
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)	51	4	14	13	8	15	25	1102	18	26	861	83
RTOR Reduction (vph)	0	13	0	0	13	0	0	0	4	0	0	18
Lane Group Flow (vph)	51	5	0	13	10	0	25	1102	14	26	861	65
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	6.8	6.8		6.8	6.8		51.9	51.9	51.9	51.9	51.9	51.9
Effective Green, g (s)	6.8	6.8		6.8	6.8		51.9	51.9	51.9	51.9	51.9	51.9
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	139	164		140	168		404	1449	1195	248	1449	1195
v/s Ratio Prot		0.00			0.01			c0.59			0.46	
v/s Ratio Perm	c0.04			0.01			0.05		0.01	0.08		0.04
v/c Ratio	0.37	0.03		0.09	0.06		0.06	0.76	0.01	0.10	0.59	0.05
Uniform Delay, d1	27.9	27.0		27.2	27.1		1.7	4.0	1.7	1.8	3.1	1.7
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	1.6	0.1		0.3	0.1		0.1	2.4	0.0	0.2	0.7	0.0
Delay (s)	29.6	27.1		27.4	27.2		1.8	6.4	1.7	2.0	3.7	1.7
Level of Service	C	C		C	C		A	A	A	A	A	A
Approach Delay (s)		28.9			27.3			6.3			3.5	
Approach LOS		C			C			A			A	

Intersection Summary

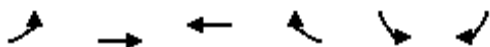
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

12: Waiale Rd & North-South Residential St

10/13/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	74	172	376	126	74	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	187	409	137	80	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		1047				
pX, platoon unblocked						
vC, conflicting volume	546				825	477
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	546				825	477
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				74	92
cM capacity (veh/h)	1024				315	588
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	267	546	127			
Volume Left	80	0	80			
Volume Right	0	137	47			
cSH	1024	1700	380			
Volume to Capacity	0.08	0.32	0.33			
Queue Length 95th (ft)	6	0	36			
Control Delay (s)	3.2	0.0	19.2			
Lane LOS	A		C			
Approach Delay (s)	3.2	0.0	19.2			
Approach LOS			C			
Intersection Summary						
Average Delay		3.5				
Intersection Capacity Utilization		57.3%		ICU Level of Service	B	
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis

13: Honoapiilani Hwy & Waiale Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	9	3	394	15	11	6	1035	218	21	787	10
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	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1793		1770	1724		1770	1863	1550	1770	1863	1583
Flt Permitted	1.00	1.00		0.68	1.00		0.24	1.00	1.00	0.11	1.00	1.00
Satd. Flow (perm)	1863	1793		1263	1724		451	1863	1550	198	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	8	9	3	415	16	12	6	1089	229	22	828	11
RTOR Reduction (vph)	0	3	0	0	10	0	0	0	0	0	0	3
Lane Group Flow (vph)	8	9	0	415	18	0	6	1089	229	22	828	8
Confl. Peds. (#/hr)						2			2			
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Free	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2		Free	6		6
Actuated Green, G (s)	3.1	1.9		22.0	16.8		68.1	68.1	98.1	68.1	68.1	68.1
Effective Green, g (s)	3.1	1.9		22.0	16.8		68.1	68.1	98.1	68.1	68.1	68.1
Actuated g/C Ratio	0.03	0.02		0.22	0.17		0.69	0.69	1.00	0.69	0.69	0.69
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)	57	34		366	295		313	1293	1550	137	1293	1098
v/s Ratio Prot	0.00	0.01		c0.19	0.01			c0.58			0.44	
v/s Ratio Perm	0.00			c0.07			0.01		0.15	0.11		0.00
v/c Ratio	0.14	0.27		1.13	0.06		0.02	0.84	0.15	0.16	0.64	0.01
Uniform Delay, d1	46.2	47.4		37.6	34.0		4.6	11.0	0.0	5.2	8.3	4.6
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	1.1	4.2		88.6	0.1		0.0	5.2	0.2	0.6	1.1	0.0
Delay (s)	47.4	51.6		126.1	34.1		4.7	16.2	0.2	5.7	9.4	4.6
Level of Service	D	D		F	C		A	B	A	A	A	A
Approach Delay (s)		49.9			120.3			13.4			9.2	
Approach LOS		D			F			B			A	

Intersection Summary

HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	98.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Honoapiilani Hwy & Kuihelani Hwy

10/13/2014

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	10	10	10	760	10	10	10	988	710	10	1104	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583	
Flt Permitted		0.98	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1817	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	11	11	11	809	11	11	11	1051	755	11	1174	11	
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	0	6	
Lane Group Flow (vph)	0	22	0	413	407	11	11	1051	755	11	1174	5	
Turn Type	Split	NA	Perm	Split	NA	Free	Prot	NA	Free	Prot	NA	Perm	
Protected Phases	4	4		3	3		5	2		1	6		
Permitted Phases			4			Free			Free			6	
Actuated Green, G (s)		4.0	4.0	40.2	40.2	117.8	2.0	52.6	117.8	2.0	52.6	52.6	
Effective Green, g (s)		4.0	4.0	40.2	40.2	117.8	2.0	52.6	117.8	2.0	52.6	52.6	
Actuated g/C Ratio		0.03	0.03	0.34	0.34	1.00	0.02	0.45	1.00	0.02	0.45	0.45	
Clearance Time (s)		5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		2.0	4.0		2.0	4.0	4.0	
Lane Grp Cap (vph)		61	53	573	576	1583	30	1580	1583	30	1580	706	
v/s Ratio Prot		0.01		c0.25	0.24		0.01	0.30		0.01	c0.33		
v/s Ratio Perm			0.00			0.01			c0.48			0.00	
v/c Ratio		0.36	0.01	0.72	0.71	0.01	0.37	0.67	0.48	0.37	0.74	0.01	
Uniform Delay, d1		55.6	55.0	33.9	33.7	0.0	57.3	25.7	0.0	57.3	27.0	18.1	
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		3.6	0.1	4.4	3.9	0.0	2.8	1.2	1.0	2.8	2.1	0.0	
Delay (s)		59.3	55.0	38.3	37.6	0.0	60.0	26.8	1.0	60.0	29.1	18.1	
Level of Service		E	E	D	D	A	E	C	A	E	C	B	
Approach Delay (s)		57.9			37.5			16.3			29.2		
Approach LOS		E			D			B			C		
Intersection Summary													
HCM 2000 Control Delay			25.2									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			117.8									Sum of lost time (s)	19.0
Intersection Capacity Utilization			68.5%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

**LOS Worksheets – Year 2022 with Partial Development with Mitigation
(Pre-Project or Better) Conditions**

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗	↗	↖	↗	↗	↖	↗	↗
Volume (vph)	30	170	71	330	80	280	31	561	454	440	556	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1849	1549	1767	1863	1583	1770	1863	1562	3433	1863	1583
Flt Permitted		0.95	1.00	0.55	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1768	1549	1030	1863	1583	1770	1863	1562	3433	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	34	191	80	371	90	315	35	630	510	494	625	11
RTOR Reduction (vph)	0	0	54	0	0	211	0	0	264	0	0	6
Lane Group Flow (vph)	0	225	26	371	90	104	35	630	246	494	625	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		27.0	27.0	27.0	27.0	27.0	3.0	28.6	28.6	12.0	37.6	37.6
Effective Green, g (s)		27.0	27.0	27.0	27.0	27.0	3.0	28.6	28.6	12.0	37.6	37.6
Actuated g/C Ratio		0.33	0.33	0.33	0.33	0.33	0.04	0.35	0.35	0.15	0.46	0.46
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		585	512	340	616	523	65	652	547	504	858	729
v/s Ratio Prot					0.05		0.02	c0.34		c0.14	0.34	
v/s Ratio Perm		0.13	0.02	c0.36		0.07			0.16			0.00
v/c Ratio		0.38	0.05	1.09	0.15	0.20	0.54	0.97	0.45	0.98	0.73	0.01
Uniform Delay, d1		20.9	18.6	27.3	19.2	19.6	38.6	26.0	20.4	34.7	17.9	11.9
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0	75.5	0.1	0.1	4.2	27.2	1.2	34.8	3.8	0.0
Delay (s)		21.2	18.6	102.8	19.3	19.7	42.9	53.2	21.7	69.4	21.7	11.9
Level of Service		C	B	F	B	B	D	D	C	E	C	B
Approach Delay (s)		20.6			59.4			39.2			42.5	
Approach LOS		C			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			43.2		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.02									
Actuated Cycle Length (s)			81.6		Sum of lost time (s)					14.0		
Intersection Capacity Utilization			86.8%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	620	70	148	438	420	70	514	206	240	205	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3539	1548	1769	3539	1540	1770	1768		1770	1735	
Flt Permitted	0.22	1.00	1.00	0.25	1.00	1.00	0.50	1.00		0.08	1.00	
Satd. Flow (perm)	409	3539	1548	475	3539	1540	934	1768		140	1735	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	379	646	73	154	456	438	73	535	215	250	214	179
RTOR Reduction (vph)	0	0	55	0	0	209	0	12	0	0	24	0
Lane Group Flow (vph)	379	646	18	154	456	229	73	738	0	250	369	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	44.1	29.7	29.7	31.5	22.1	22.1	50.5	48.1		65.1	57.7	
Effective Green, g (s)	44.1	29.7	29.7	31.5	22.1	22.1	50.5	48.1		65.1	57.7	
Actuated g/C Ratio	0.37	0.25	0.25	0.26	0.19	0.19	0.42	0.40		0.55	0.48	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	345	881	385	227	656	285	412	713		240	839	
v/s Ratio Prot	c0.16	0.18		0.05	0.13		0.00	0.42		c0.10	0.21	
v/s Ratio Perm	c0.25		0.01	0.13		0.15	0.07			c0.46		
v/c Ratio	1.10	0.73	0.05	0.68	0.70	0.80	0.18	1.04		1.04	0.44	
Uniform Delay, d1	31.9	41.1	34.0	35.7	45.4	46.5	21.0	35.5		37.4	20.2	
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	77.6	3.2	0.1	6.2	3.2	14.9	0.1	43.1		69.4	0.4	
Delay (s)	109.5	44.3	34.1	41.9	48.6	61.4	21.1	78.7		106.8	20.5	
Level of Service	F	D	C	D	D	E	C	E		F	C	
Approach Delay (s)		66.1			53.0			73.5			54.1	
Approach LOS		E			D			E			D	
Intersection Summary												
HCM 2000 Control Delay			61.9			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			119.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			102.7%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Volume (vph)	169	417	170	70	483	210	220	571	80	100	475	203
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	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.96		1.00	0.98		1.00	0.96	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1776			1774		1766	1828		1770	1767	
Flt Permitted		0.61			0.89		0.22	1.00		0.22	1.00	
Satd. Flow (perm)		1103			1578		413	1828		414	1767	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	178	439	179	74	508	221	232	601	84	105	500	214
RTOR Reduction (vph)	0	23	0	0	31	0	0	11	0	0	34	0
Lane Group Flow (vph)	0	773	0	0	772	0	232	674	0	105	680	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Effective Green, g (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio		0.42			0.42		0.40	0.40		0.40	0.40	
Clearance Time (s)		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	
Lane Grp Cap (vph)		465			666		165	731		165	706	
v/s Ratio Prot								0.37			0.38	
v/s Ratio Perm		c0.70			0.49		c0.56			0.25		
v/c Ratio		1.66			1.16		1.41	0.92		0.64	0.96	
Uniform Delay, d1		13.0			13.0		13.5	12.8		10.9	13.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		307.4			87.9		214.9	17.0		7.8	24.9	
Delay (s)		320.4			100.9		228.4	29.8		18.7	38.0	
Level of Service		F			F		F	C		B	D	
Approach Delay (s)		320.4			100.9			80.1			35.6	
Approach LOS		F			F			F			D	
Intersection Summary												
HCM 2000 Control Delay		131.5			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.54										
Actuated Cycle Length (s)		45.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		139.0%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	837	0	50	0	0	0	60	1114	0	0	891	613
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539			3539	1583
Flt Permitted	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	872	0	52	0	0	0	62	1160	0	0	928	639
RTOR Reduction (vph)	0	0	37	0	0	0	0	0	0	0	0	393
Lane Group Flow (vph)	436	436	15	0	0	0	62	1160	0	0	928	246
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	18.2	18.2	18.2				2.2	31.2			24.0	24.0
Effective Green, g (s)	18.2	18.2	18.2				2.2	31.2			24.0	24.0
Actuated g/C Ratio	0.29	0.29	0.29				0.04	0.50			0.38	0.38
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0			5.0	5.0
Lane Grp Cap (vph)	490	490	461				62	1769			1361	608
v/s Ratio Prot	c0.26	0.26					0.04	c0.33			0.26	
v/s Ratio Perm			0.01									0.16
v/c Ratio	0.89	0.89	0.03				1.00	0.66			0.68	0.40
Uniform Delay, d1	21.1	21.1	15.8				30.1	11.6			16.0	14.0
Progression Factor	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	17.3	17.3	0.0				114.3	1.2			1.8	0.9
Delay (s)	38.4	38.4	15.8				144.4	12.8			17.9	14.9
Level of Service	D	D	B				F	B			B	B
Approach Delay (s)		37.1			0.0			19.5			16.7	
Approach LOS		D			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			22.7				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			62.4				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			72.3%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	196	157	141	10	112	50	246	160	10	100	90	175
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	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.95		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1731		1770	1777		1770	1846		1770	1678	
Flt Permitted	0.65	1.00		0.52	1.00		0.58	1.00		0.64	1.00	
Satd. Flow (perm)	1204	1731		976	1777		1087	1846		1194	1678	
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)	213	171	153	11	122	54	267	174	11	109	98	190
RTOR Reduction (vph)	0	88	0	0	36	0	0	5	0	0	110	0
Lane Group Flow (vph)	213	236	0	11	140	0	267	180	0	109	178	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.3	11.3		11.3	11.3		13.9	13.9		13.9	13.9	
Effective Green, g (s)	11.3	11.3		11.3	11.3		13.9	13.9		13.9	13.9	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.42	0.42		0.42	0.42	
Clearance Time (s)	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	
Lane Grp Cap (vph)	409	589		332	604		455	772		499	702	
v/s Ratio Prot		0.14			0.08			0.10			0.11	
v/s Ratio Perm	c0.18			0.01			c0.25			0.09		
v/c Ratio	0.52	0.40		0.03	0.23		0.59	0.23		0.22	0.25	
Uniform Delay, d1	8.8	8.4		7.3	7.8		7.4	6.2		6.2	6.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.4		0.0	0.2		1.9	0.2		0.2	0.2	
Delay (s)	10.0	8.8		7.3	8.0		9.4	6.4		6.4	6.5	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		9.3			8.0			8.1			6.4	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.1			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.56										
Actuated Cycle Length (s)		33.2			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		62.7%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	80	32	384	140	390	43	568	351	370	582	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1840	1583	1770	1863	1533	1770	1863	1583	3433	1863	1583
Flt Permitted		0.93	1.00	0.69	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1733	1583	1280	1863	1533	1770	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	86	34	413	151	419	46	611	377	398	626	32
RTOR Reduction (vph)	0	0	23	0	0	190	0	0	236	0	0	17
Lane Group Flow (vph)	0	108	11	413	151	229	46	611	141	398	626	15
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		26.8	26.8	26.8	26.8	26.8	3.0	30.2	30.2	10.0	37.2	37.2
Effective Green, g (s)		26.8	26.8	26.8	26.8	26.8	3.0	30.2	30.2	10.0	37.2	37.2
Actuated g/C Ratio		0.33	0.33	0.33	0.33	0.33	0.04	0.37	0.37	0.12	0.46	0.46
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		573	523	423	616	507	65	694	590	423	855	727
v/s Ratio Prot					0.08		0.03	c0.33		c0.12	0.34	
v/s Ratio Perm		0.06	0.01	c0.32		0.15			0.09			0.01
v/c Ratio		0.19	0.02	0.98	0.25	0.45	0.71	0.88	0.24	0.94	0.73	0.02
Uniform Delay, d1		19.3	18.3	26.8	19.7	21.3	38.6	23.7	17.5	35.2	17.8	12.0
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0	37.2	0.2	0.5	24.8	13.4	0.4	28.9	4.0	0.0
Delay (s)		19.5	18.3	64.0	19.9	21.8	63.4	37.1	17.9	64.1	21.8	12.0
Level of Service		B	B	E	B	C	E	D	B	E	C	B
Approach Delay (s)		19.2			39.2			31.3			37.5	
Approach LOS		B			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			35.2				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			81.0				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			80.1%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	480	50	171	645	400	30	238	127	340	446	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1543	1768	3539	1583	1769	1752		1769	1768	
Flt Permitted	0.21	1.00	1.00	0.36	1.00	1.00	0.16	1.00		0.25	1.00	
Satd. Flow (perm)	393	3539	1543	675	3539	1583	296	1752		471	1768	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	238	495	52	176	665	412	31	245	131	351	460	205
RTOR Reduction (vph)	0	0	38	0	0	304	0	22	0	0	18	0
Lane Group Flow (vph)	238	495	14	176	665	108	31	354	0	351	647	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.9	25.2		40.3	33.6	
Effective Green, g (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.9	25.2		40.3	33.6	
Actuated g/C Ratio	0.36	0.27	0.27	0.35	0.26	0.26	0.31	0.29		0.47	0.39	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	271	944	411	332	923	413	121	514		374	692	
v/s Ratio Prot	c0.08	0.14		0.05	0.19		0.01	0.20		c0.11	0.37	
v/s Ratio Perm	c0.23		0.01	0.14		0.07	0.07			c0.33		
v/c Ratio	0.88	0.52	0.03	0.53	0.72	0.26	0.26	0.69		0.94	0.94	
Uniform Delay, d1	21.7	26.8	23.3	20.3	28.9	25.1	22.4	26.8		18.7	25.1	
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	25.2	0.5	0.0	0.8	2.8	0.3	0.4	3.8		30.5	19.9	
Delay (s)	46.9	27.3	23.3	21.2	31.6	25.5	22.8	30.7		49.3	44.9	
Level of Service	D	C	C	C	C	C	C	C		D	D	
Approach Delay (s)		33.0			28.1			30.1			46.4	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			34.8									
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			85.8									
Intersection Capacity Utilization			86.5%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Volume (vph)	286	501	140	30	484	70	150	368	40	100	412	341
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	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.98			0.98		1.00	0.99		1.00	0.93	
Flt Protected		0.98			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1791			1828		1770	1835		1770	1725	
Flt Permitted		0.64			0.93		0.20	1.00		0.31	1.00	
Satd. Flow (perm)		1158			1713		373	1835		576	1725	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	292	511	143	31	494	71	153	376	41	102	420	348
RTOR Reduction (vph)	0	11	0	0	8	0	0	7	0	0	50	0
Lane Group Flow (vph)	0	935	0	0	588	0	153	410	0	102	718	0
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		32.0			32.0		20.0	20.0		20.0	20.0	
Effective Green, g (s)		32.0			32.0		20.0	20.0		20.0	20.0	
Actuated g/C Ratio		0.53			0.53		0.33	0.33		0.33	0.33	
Clearance Time (s)		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	
Lane Grp Cap (vph)		617			913		124	611		192	575	
v/s Ratio Prot								0.22			c0.42	
v/s Ratio Perm		c0.81			0.34		0.41			0.18		
v/c Ratio		1.52			0.64		1.23	0.67		0.53	1.25	
Uniform Delay, d1		14.0			10.0		20.0	17.2		16.2	20.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		240.4			1.6		156.7	2.9		2.8	125.9	
Delay (s)		254.4			11.5		176.7	20.1		19.0	145.9	
Level of Service		F			B		F	C		B	F	
Approach Delay (s)		254.4			11.5			62.1			131.0	
Approach LOS		F			B			E			F	
Intersection Summary												
HCM 2000 Control Delay		133.1			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.41										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		146.4%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	671	0	10	0	0	0	60	899	0	10	1237	884
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539		1770	3539	1550
Flt Permitted	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539		1770	3539	1550
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)	729	0	11	0	0	0	65	977	0	11	1345	961
RTOR Reduction (vph)	0	0	8	0	0	0	0	0	0	0	0	504
Lane Group Flow (vph)	364	365	3	0	0	0	65	977	0	11	1345	457
Confl. Peds. (#/hr)												1
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	15.2	15.2	15.2				2.3	32.8		0.6	31.1	31.1
Effective Green, g (s)	15.2	15.2	15.2				2.3	32.8		0.6	31.1	31.1
Actuated g/C Ratio	0.23	0.23	0.23				0.03	0.49		0.01	0.47	0.47
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)	383	383	361				61	1742		15	1652	723
v/s Ratio Prot	0.22	c0.22					c0.04	0.28		0.01	c0.38	
v/s Ratio Perm			0.00									0.30
v/c Ratio	0.95	0.95	0.01				1.07	0.56		0.73	0.81	0.63
Uniform Delay, d1	25.3	25.3	19.9				32.1	11.9		32.9	15.3	13.4
Progression Factor	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.0	33.5	0.0				134.6	0.7		93.0	3.6	2.5
Delay (s)	58.4	58.9	19.9				166.8	12.5		125.9	18.9	15.9
Level of Service	E	E	B				F	B		F	B	B
Approach Delay (s)		58.1			0.0			22.2			18.2	
Approach LOS		E			A			C			B	
Intersection Summary												
HCM 2000 Control Delay			26.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			66.6				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			71.1%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	158	120	183	20	160	130	126	80	10	100	130	175
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	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.93		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1694		1770	1738		1770	1831		1770	1702	
Flt Permitted	0.55	1.00		0.53	1.00		0.56	1.00		0.69	1.00	
Satd. Flow (perm)	1033	1694		992	1738		1045	1831		1292	1702	
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	130	199	22	174	141	137	87	11	109	141	190
RTOR Reduction (vph)	0	138	0	0	85	0	0	6	0	0	111	0
Lane Group Flow (vph)	172	191	0	22	230	0	137	92	0	109	220	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.7	8.7		8.7	8.7		11.9	11.9		11.9	11.9	
Effective Green, g (s)	8.7	8.7		8.7	8.7		11.9	11.9		11.9	11.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.42	0.42		0.42	0.42	
Clearance Time (s)	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	
Lane Grp Cap (vph)	314	515		301	528		434	761		537	708	
v/s Ratio Prot		0.11			0.13			0.05			0.13	
v/s Ratio Perm	c0.17			0.02			c0.13			0.08		
v/c Ratio	0.55	0.37		0.07	0.44		0.32	0.12		0.20	0.31	
Uniform Delay, d1	8.3	7.8		7.1	8.0		5.6	5.1		5.3	5.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.5		0.1	0.6		0.4	0.1		0.2	0.3	
Delay (s)	10.3	8.3		7.2	8.6		6.0	5.2		5.5	5.9	
Level of Service	B	A		A	A		A	A		A	A	
Approach Delay (s)		8.9			8.5			5.7			5.8	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			28.6			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			63.0%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

**LOS Worksheets – Year 2022 with Partial Development with Mitigation
(LOS D or Better) Conditions**

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	620	70	148	438	420	70	514	206	240	205	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	1.00
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)	1768	3539	1549	1769	3539	1543	1770	1863	1558	1769	1735	1735
Flt Permitted	0.33	1.00	1.00	0.25	1.00	1.00	0.41	1.00	1.00	0.12	1.00	1.00
Satd. Flow (perm)	619	3539	1549	463	3539	1543	773	1863	1558	231	1735	1735
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	379	646	73	154	456	438	73	535	215	250	214	179
RTOR Reduction (vph)	0	0	54	0	0	170	0	0	145	0	32	0
Lane Group Flow (vph)	379	646	19	154	456	268	73	535	70	250	361	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	32.6	22.5	22.5	28.6	20.5	20.5	32.1	28.2	28.2	40.3	32.3	
Effective Green, g (s)	32.6	22.5	22.5	28.6	20.5	20.5	32.1	28.2	28.2	40.3	32.3	
Actuated g/C Ratio	0.38	0.26	0.26	0.33	0.24	0.24	0.37	0.32	0.32	0.46	0.37	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	366	917	401	274	835	364	330	605	506	249	645	
v/s Ratio Prot	c0.12	0.18		0.05	0.13		0.01	0.29		c0.09	0.21	
v/s Ratio Perm	c0.27		0.01	0.13		0.17	0.07		0.04	c0.37		
v/c Ratio	1.04	0.70	0.05	0.56	0.55	0.74	0.22	0.88	0.14	1.00	0.56	
Uniform Delay, d1	24.6	29.1	24.1	21.8	29.1	30.6	18.2	27.8	20.7	20.5	21.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	56.5	2.5	0.0	1.6	0.7	7.5	0.1	14.4	0.1	58.1	1.1	
Delay (s)	81.1	31.6	24.2	23.4	29.8	38.2	18.3	42.1	20.8	78.6	22.7	
Level of Service	F	C	C	C	C	D	B	D	C	E	C	
Approach Delay (s)		48.2			32.4			34.5			44.4	
Approach LOS		D			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			39.8			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			86.8			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			90.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	169	417	170	70	483	210	220	571	80	100	475	203
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	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1768	1770		1768	1863	1548	1766	1828		1770	1768	
Flt Permitted	0.31	1.00		0.26	1.00	1.00	0.25	1.00		0.25	1.00	
Satd. Flow (perm)	568	1770		493	1863	1548	465	1828		466	1768	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	178	439	179	74	508	221	232	601	84	105	500	214
RTOR Reduction (vph)	0	37	0	0	0	93	0	12	0	0	38	0
Lane Group Flow (vph)	178	581	0	74	508	128	232	673	0	105	676	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	15.1	15.1		15.1	15.1	15.1	16.0	16.0		16.0	16.0	
Effective Green, g (s)	15.1	15.1		15.1	15.1	15.1	16.0	16.0		16.0	16.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.39	0.39	0.41	0.41		0.41	0.41	
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)	219	683		190	719	597	190	748		190	723	
v/s Ratio Prot		c0.33			0.27			0.37			0.38	
v/s Ratio Perm	0.31			0.15		0.08	c0.50			0.23		
v/c Ratio	0.81	0.85		0.39	0.71	0.21	1.22	0.90		0.55	0.94	
Uniform Delay, d1	10.7	11.0		8.7	10.1	8.0	11.6	10.8		8.8	11.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.1	9.9		1.3	3.2	0.2	137.4	13.6		3.5	19.2	
Delay (s)	30.8	20.9		10.0	13.3	8.2	148.9	24.4		12.3	30.3	
Level of Service	C	C		A	B	A	F	C		B	C	
Approach Delay (s)		23.1			11.6			55.9			28.0	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			30.5									
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			39.1									
Intersection Capacity Utilization			99.5%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	480	50	171	645	400	30	238	127	340	446	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	1.00
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	1543	1768	3539	1583	1769	1863	1563	1769	1768	1768
Flt Permitted	0.21	1.00	1.00	0.36	1.00	1.00	0.16	1.00	1.00	0.41	1.00	1.00
Satd. Flow (perm)	394	3539	1543	677	3539	1583	298	1863	1563	770	1768	1768
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	238	495	52	176	665	412	31	245	131	351	460	205
RTOR Reduction (vph)	0	0	38	0	0	304	0	0	93	0	18	0
Lane Group Flow (vph)	238	495	14	176	665	108	31	245	38	351	647	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.7	25.0	25.0	40.1	33.4	
Effective Green, g (s)	31.0	22.9	22.9	30.0	22.4	22.4	26.7	25.0	25.0	40.1	33.4	
Actuated g/C Ratio	0.36	0.27	0.27	0.35	0.26	0.26	0.31	0.29	0.29	0.47	0.39	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	272	946	412	334	926	414	122	544	456	478	689	
v/s Ratio Prot	c0.08	0.14		0.05	0.19		0.01	0.13		c0.09	c0.37	
v/s Ratio Perm	c0.23		0.01	0.14		0.07	0.07		0.02	0.26		
v/c Ratio	0.88	0.52	0.03	0.53	0.72	0.26	0.25	0.45	0.08	0.73	0.94	
Uniform Delay, d1	21.6	26.7	23.2	20.2	28.7	25.0	22.4	24.7	22.0	16.6	25.1	
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	24.7	0.5	0.0	0.7	2.7	0.3	0.4	0.6	0.1	5.0	20.5	
Delay (s)	46.2	27.2	23.2	20.9	31.4	25.4	22.8	25.3	22.1	21.6	45.7	
Level of Service	D	C	C	C	C	C	C	C	C	C	D	
Approach Delay (s)		32.7			28.0			24.1			37.4	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			31.3			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			85.6			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			86.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	501	140	30	484	70	150	368	40	100	412	341
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	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1793		1769	1863	1583	1770	1835		1770	1725	
Flt Permitted	0.35	1.00		0.20	1.00	1.00	0.24	1.00		0.38	1.00	
Satd. Flow (perm)	654	1793		377	1863	1583	438	1835		713	1725	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	292	511	143	31	494	71	153	376	41	102	420	348
RTOR Reduction (vph)	0	22	0	0	0	39	0	9	0	0	67	0
Lane Group Flow (vph)	292	632	0	31	494	32	153	408	0	102	701	0
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	20.0	20.0		20.0	20.0	20.0	17.0	17.0		17.0	17.0	
Effective Green, g (s)	20.0	20.0		20.0	20.0	20.0	17.0	17.0		17.0	17.0	
Actuated g/C Ratio	0.44	0.44		0.44	0.44	0.44	0.38	0.38		0.38	0.38	
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)	290	796		167	828	703	165	693		269	651	
v/s Ratio Prot		0.35			0.27			0.22			c0.41	
v/s Ratio Perm	c0.45			0.08		0.02	0.35			0.14		
v/c Ratio	1.01	0.79		0.19	0.60	0.04	0.93	0.59		0.38	1.08	
Uniform Delay, d1	12.5	10.7		7.6	9.5	7.1	13.4	11.2		10.2	14.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	54.6	5.5		0.5	1.2	0.0	48.7	1.3		0.9	58.0	
Delay (s)	67.1	16.2		8.1	10.6	7.1	62.1	12.5		11.1	72.0	
Level of Service	E	B		A	B	A	E	B		B	E	
Approach Delay (s)		31.9			10.1			25.8			64.8	
Approach LOS		C			B			C			E	
Intersection Summary												
HCM 2000 Control Delay			36.0				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			45.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			105.6%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

LOS Worksheets – Year 2026 with Project with Mitigation (Pre-Project or Better) Conditions

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	210	81	303	150	320	61	572	439	460	592	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1848	1549	1767	1863	1583	1770	1863	1562	3433	1863	1583
Flt Permitted		0.93	1.00	0.47	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1729	1549	880	1863	1583	1770	1863	1562	3433	1863	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	236	91	340	169	360	69	643	493	517	665	11
RTOR Reduction (vph)	0	0	59	0	0	214	0	0	231	0	0	6
Lane Group Flow (vph)	0	281	33	340	169	146	69	643	262	517	665	5
Confl. Peds. (#/hr)			1	1					1			
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		36.0	36.0	36.0	36.0	36.0	4.0	35.8	35.8	15.0	46.8	46.8
Effective Green, g (s)		36.0	36.0	36.0	36.0	36.0	4.0	35.8	35.8	15.0	46.8	46.8
Actuated g/C Ratio		0.36	0.36	0.36	0.36	0.36	0.04	0.36	0.36	0.15	0.46	0.46
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		617	553	314	665	565	70	661	554	510	864	734
v/s Ratio Prot					0.09		0.04	c0.35		c0.15	0.36	
v/s Ratio Perm		0.16	0.02	c0.39		0.09			0.17			0.00
v/c Ratio		0.46	0.06	1.08	0.25	0.26	0.99	0.97	0.47	1.01	0.77	0.01
Uniform Delay, d1		24.9	21.3	32.4	22.9	22.9	48.4	32.0	25.2	42.9	22.5	14.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	0.0	74.7	0.1	0.2	101.7	28.4	1.3	43.3	4.9	0.0
Delay (s)		25.3	21.3	107.1	23.1	23.1	150.1	60.4	26.5	86.2	27.4	14.5
Level of Service		C	C	F	C	C	F	E	C	F	C	B
Approach Delay (s)		24.3			56.0			51.7			52.8	
Approach LOS		C			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			50.3				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			1.02									
Actuated Cycle Length (s)			100.8				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			89.1%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	667	70	171	453	400	140	587	262	250	244	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3539	1547	1769	3539	1539	1770	1760		1770	1748	
Flt Permitted	0.19	1.00	1.00	0.17	1.00	1.00	0.40	1.00		0.07	1.00	
Satd. Flow (perm)	351	3539	1547	325	3539	1539	748	1760		122	1748	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	388	695	73	178	472	417	146	611	273	260	254	177
RTOR Reduction (vph)	0	0	56	0	0	194	0	12	0	0	19	0
Lane Group Flow (vph)	388	695	17	178	472	223	146	872	0	260	412	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	45.9	29.3	29.3	34.5	22.9	22.9	63.9	57.0		72.1	61.1	
Effective Green, g (s)	45.9	29.3	29.3	34.5	22.9	22.9	63.9	57.0		72.1	61.1	
Actuated g/C Ratio	0.36	0.23	0.23	0.27	0.18	0.18	0.50	0.44		0.56	0.47	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	323	804	351	216	628	273	425	778		208	828	
v/s Ratio Prot	c0.17	0.20		0.07	0.13		0.02	0.50		c0.11	0.24	
v/s Ratio Perm	c0.26		0.01	0.15		0.14	0.15			c0.59		
v/c Ratio	1.20	0.86	0.05	0.82	0.75	0.82	0.34	1.12		1.25	0.50	
Uniform Delay, d1	34.9	47.9	38.9	39.4	50.3	51.0	18.5	36.0		41.1	23.3	
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	116.4	9.6	0.1	20.9	5.1	16.9	0.2	70.7		145.9	0.5	
Delay (s)	151.4	57.5	39.0	60.3	55.4	67.9	18.7	106.7		186.9	23.8	
Level of Service	F	E	D	E	E	E	B	F		F	C	
Approach Delay (s)		87.8			61.1			94.2			85.2	
Approach LOS		F			E			F			F	
Intersection Summary												
HCM 2000 Control Delay	81.8			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.29											
Actuated Cycle Length (s)	128.9			Sum of lost time (s)					20.0			
Intersection Capacity Utilization	111.3%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Volume (vph)	189	490	160	70	488	230	250	653	80	120	503	195
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	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.96		1.00	0.98		1.00	0.96	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1786			1770		1766	1832		1770	1774	
Flt Permitted		0.58			0.88		0.22	1.00		0.22	1.00	
Satd. Flow (perm)		1055			1559		413	1832		414	1774	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	516	168	74	514	242	263	687	84	126	529	205
RTOR Reduction (vph)	0	19	0	0	33	0	0	10	0	0	31	0
Lane Group Flow (vph)	0	864	0	0	797	0	263	761	0	126	703	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Effective Green, g (s)		19.0			19.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio		0.42			0.42		0.40	0.40		0.40	0.40	
Clearance Time (s)		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	
Lane Grp Cap (vph)		445			658		165	732		165	709	
v/s Ratio Prot								0.42			0.40	
v/s Ratio Perm		c0.82			0.51		c0.64			0.30		
v/c Ratio		1.94			1.21		1.59	1.04		0.76	0.99	
Uniform Delay, d1		13.0			13.0		13.5	13.5		11.7	13.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		431.8			108.8		293.9	44.1		18.7	31.5	
Delay (s)		444.8			121.8		307.4	57.6		30.4	44.9	
Level of Service		F			F		F	E		C	D	
Approach Delay (s)		444.8			121.8			121.2			42.8	
Approach LOS		F			F			F			D	
Intersection Summary												
HCM 2000 Control Delay		181.9			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.77										
Actuated Cycle Length (s)		45.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		151.3%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	910	0	50	0	0	0	110	1335	0	0	940	668
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539			3539	1583
Flt Permitted	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	948	0	52	0	0	0	115	1391	0	0	979	696
RTOR Reduction (vph)	0	0	36	0	0	0	0	0	0	0	0	422
Lane Group Flow (vph)	474	474	16	0	0	0	115	1391	0	0	979	274
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	27.3	27.3	27.3				7.6	46.9			34.3	34.3
Effective Green, g (s)	27.3	27.3	27.3				7.6	46.9			34.3	34.3
Actuated g/C Ratio	0.31	0.31	0.31				0.09	0.54			0.39	0.39
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0			7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0			5.0	5.0
Lane Grp Cap (vph)	526	526	495				154	1903			1392	622
v/s Ratio Prot	c0.28	0.28					0.06	c0.39			0.28	
v/s Ratio Perm			0.01									0.17
v/c Ratio	0.90	0.90	0.03				0.75	0.73			0.70	0.44
Uniform Delay, d1	28.7	28.7	20.8				38.9	15.3			22.2	19.4
Progression Factor	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	18.2	18.2	0.0				15.7	1.8			2.1	1.0
Delay (s)	46.8	46.8	20.8				54.6	17.1			24.2	20.4
Level of Service	D	D	C				D	B			C	C
Approach Delay (s)		45.5			0.0			20.0			22.7	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			27.2				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			87.2				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			80.4%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	232	160	10	132	50	259	180	10	100	90	206
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	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.96		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1749		1770	1786		1770	1848		1770	1668	
Flt Permitted	0.63	1.00		0.41	1.00		0.54	1.00		0.63	1.00	
Satd. Flow (perm)	1181	1749		765	1786		1002	1848		1170	1668	
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	252	174	11	143	54	282	196	11	109	98	224
RTOR Reduction (vph)	0	64	0	0	33	0	0	5	0	0	137	0
Lane Group Flow (vph)	304	362	0	11	164	0	282	202	0	109	185	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.4	13.4		13.4	13.4		13.6	13.6		13.6	13.6	
Effective Green, g (s)	13.4	13.4		13.4	13.4		13.6	13.6		13.6	13.6	
Actuated g/C Ratio	0.38	0.38		0.38	0.38		0.39	0.39		0.39	0.39	
Clearance Time (s)	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	
Lane Grp Cap (vph)	452	669		292	683		389	718		454	648	
v/s Ratio Prot		0.21			0.09			0.11			0.11	
v/s Ratio Perm	c0.26			0.01			c0.28			0.09		
v/c Ratio	0.67	0.54		0.04	0.24		0.72	0.28		0.24	0.29	
Uniform Delay, d1	9.0	8.4		6.8	7.3		9.1	7.3		7.2	7.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.9		0.1	0.2		6.6	0.2		0.3	0.2	
Delay (s)	12.9	9.3		6.8	7.5		15.7	7.6		7.5	7.6	
Level of Service	B	A		A	A		B	A		A	A	
Approach Delay (s)		10.8			7.5			12.2			7.6	
Approach LOS		B			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			10.1				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			35.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			70.6%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	575	180	90	600	570	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	639	200	100	667	633	300
RTOR Reduction (vph)	0	121	0	0	0	214
Lane Group Flow (vph)	639	79	100	667	633	86
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	28.9	28.9	5.2	31.1	20.9	20.9
Effective Green, g (s)	28.9	28.9	5.2	31.1	20.9	20.9
Actuated g/C Ratio	0.40	0.40	0.07	0.43	0.29	0.29
Clearance Time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	699	625	125	1505	1011	452
v/s Ratio Prot	c0.36		c0.06	0.19	c0.18	
v/s Ratio Perm		0.05				0.05
v/c Ratio	0.91	0.13	0.80	0.44	0.63	0.19
Uniform Delay, d1	20.9	14.1	33.4	14.9	22.7	19.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.2	0.0	28.1	0.2	1.2	0.2
Delay (s)	37.1	14.1	61.5	15.1	23.9	19.9
Level of Service	D	B	E	B	C	B
Approach Delay (s)	31.6			21.1	22.6	
Approach LOS	C			C	C	

Intersection Summary

HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	73.1	Sum of lost time (s)	18.1
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Honoapiilani Hwy & Kuikahi Drive

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↩	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩
Volume (vph)	20	100	32	367	170	410	73	596	336	400	640	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes		1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1844	1583	1770	1863	1533	1770	1863	1583	3433	1863	1583
Flt Permitted		0.94	1.00	0.67	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1742	1583	1255	1863	1533	1770	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	108	34	395	183	441	78	641	361	430	688	43
RTOR Reduction (vph)	0	0	23	0	0	205	0	0	224	0	0	23
Lane Group Flow (vph)	0	130	11	395	183	236	78	641	137	430	688	20
Confl. Peds. (#/hr)	6					6						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		25.0	25.0	25.0	25.0	25.0	4.0	30.5	30.5	11.0	37.5	37.5
Effective Green, g (s)		25.0	25.0	25.0	25.0	25.0	4.0	30.5	30.5	11.0	37.5	37.5
Actuated g/C Ratio		0.31	0.31	0.31	0.31	0.31	0.05	0.38	0.38	0.14	0.47	0.47
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.0	5.0	5.0	2.0	5.0	5.0
Lane Grp Cap (vph)		540	491	389	578	476	87	705	599	469	867	737
v/s Ratio Prot					0.10		0.04	c0.34		c0.13	0.37	
v/s Ratio Perm		0.07	0.01	c0.31		0.15			0.09			0.01
v/c Ratio		0.24	0.02	1.02	0.32	0.49	0.90	0.91	0.23	0.92	0.79	0.03
Uniform Delay, d1		20.7	19.3	27.8	21.2	22.6	38.0	23.7	17.0	34.3	18.2	11.6
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0	49.6	0.2	0.6	61.8	16.4	0.4	22.2	5.8	0.0
Delay (s)		20.8	19.3	77.3	21.4	23.2	99.8	40.1	17.4	56.5	24.0	11.7
Level of Service		C	B	E	C	C	F	D	B	E	C	B
Approach Delay (s)		20.5			43.9			36.8			35.6	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.7				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			80.5				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			81.4%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	506	80	215	720	400	30	287	157	360	526	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1543	1768	3539	1583	1769	1750		1769	1795	
Flt Permitted	0.17	1.00	1.00	0.32	1.00	1.00	0.15	1.00		0.16	1.00	
Satd. Flow (perm)	321	3539	1543	604	3539	1583	281	1750		303	1795	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	522	82	222	742	412	31	296	162	371	542	152
RTOR Reduction (vph)	0	0	61	0	0	300	0	22	0	0	11	0
Lane Group Flow (vph)	205	522	21	222	742	112	31	436	0	371	683	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	30.2	23.2	23.2	30.2	23.2	23.2	28.2	26.5		43.5	36.8	
Effective Green, g (s)	30.2	23.2	23.2	30.2	23.2	23.2	28.2	26.5		43.5	36.8	
Actuated g/C Ratio	0.34	0.26	0.26	0.34	0.26	0.26	0.32	0.30		0.49	0.41	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	223	925	403	297	925	414	117	522		346	744	
v/s Ratio Prot	c0.07	0.15		0.06	0.21		0.01	0.25		c0.14	0.38	
v/s Ratio Perm	c0.24		0.01	0.20		0.07	0.08			c0.38		
v/c Ratio	0.92	0.56	0.05	0.75	0.80	0.27	0.26	0.84		1.07	0.92	
Uniform Delay, d1	24.2	28.4	24.5	23.5	30.6	26.0	22.7	29.1		20.8	24.5	
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	37.8	0.8	0.1	8.7	5.1	0.4	0.4	11.1		68.9	16.1	
Delay (s)	62.0	29.2	24.6	32.2	35.7	26.4	23.2	40.2		89.7	40.6	
Level of Service	E	C	C	C	D	C	C	D		F	D	
Approach Delay (s)		37.0			32.3			39.1			57.7	
Approach LOS		D			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			41.5			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			88.7			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			92.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	271	523	170	30	555	90	130	410	40	100	503	351
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	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.98			0.98		1.00	0.99		1.00	0.94	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1786			1825		1770	1838		1770	1737	
Flt Permitted		0.60			0.94		0.17	1.00		0.25	1.00	
Satd. Flow (perm)		1094			1718		310	1838		474	1737	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	277	534	173	31	566	92	133	418	41	102	513	358
RTOR Reduction (vph)	0	11	0	0	8	0	0	5	0	0	36	0
Lane Group Flow (vph)	0	973	0	0	681	0	133	454	0	102	835	0
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		38.0			38.0		24.0	24.0		24.0	24.0	
Effective Green, g (s)		38.0			38.0		24.0	24.0		24.0	24.0	
Actuated g/C Ratio		0.54			0.54		0.34	0.34		0.34	0.34	
Clearance Time (s)		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	
Lane Grp Cap (vph)		593			932		106	630		162	595	
v/s Ratio Prot								0.25			c0.48	
v/s Ratio Perm		c0.89			0.40		0.43			0.22		
v/c Ratio		1.64			0.73		1.25	0.72		0.63	1.40	
Uniform Delay, d1		16.0			12.1		23.0	20.1		19.3	23.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		296.0			3.0		170.8	4.0		7.4	191.4	
Delay (s)		312.0			15.1		193.8	24.1		26.7	214.4	
Level of Service		F			B		F	C		C	F	
Approach Delay (s)		312.0			15.1			62.2			194.7	
Approach LOS		F			B			E			F	
Intersection Summary												
HCM 2000 Control Delay		167.9					HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio		1.55										
Actuated Cycle Length (s)		70.0					Sum of lost time (s)			8.0		
Intersection Capacity Utilization		157.7%					ICU Level of Service			H		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Kuihelani Hwy & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	743	0	10	0	0	0	70	947	0	10	1405	965
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Lane Util. Factor	0.95	0.95	1.00				1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583				1770	3539		1770	3539	1550
Flt Permitted	0.95	0.95	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583				1770	3539		1770	3539	1550
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)	808	0	11	0	0	0	76	1029	0	11	1527	1049
RTOR Reduction (vph)	0	0	8	0	0	0	0	0	0	0	0	487
Lane Group Flow (vph)	404	404	3	0	0	0	76	1029	0	11	1527	562
Confl. Peds. (#/hr)												1
Turn Type	Split	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	22.8	22.8	22.8				3.9	49.4		0.6	46.1	46.1
Effective Green, g (s)	22.8	22.8	22.8				3.9	49.4		0.6	46.1	46.1
Actuated g/C Ratio	0.25	0.25	0.25				0.04	0.54		0.01	0.51	0.51
Clearance Time (s)	6.0	6.0	6.0				5.0	7.0		5.0	7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0				2.0	5.0		2.0	5.0	5.0
Lane Grp Cap (vph)	422	422	397				76	1925		11	1796	786
v/s Ratio Prot	c0.24	0.24					c0.04	c0.29		0.01	c0.43	
v/s Ratio Perm			0.00									0.36
v/c Ratio	0.96	0.96	0.01				1.00	0.53		1.00	0.85	0.71
Uniform Delay, d1	33.5	33.5	25.5				43.4	13.3		45.1	19.4	17.3
Progression Factor	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	32.4	32.4	0.0				103.2	0.5		271.4	4.5	3.8
Delay (s)	65.9	65.9	25.5				146.7	13.8		316.5	23.8	21.1
Level of Service	E	E	C				F	B		F	C	C
Approach Delay (s)		65.4			0.0			23.0			24.0	
Approach LOS		E			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			31.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			90.8				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			78.3%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: S. Kamehameha Ave & Waiko Rd

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	196	151	198	20	222	130	135	80	10	100	130	257
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	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.94		1.00	0.98		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1704		1770	1760		1770	1831		1770	1677	
Flt Permitted	0.49	1.00		0.49	1.00		0.41	1.00		0.69	1.00	
Satd. Flow (perm)	908	1704		914	1760		767	1831		1292	1677	
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)	213	164	215	22	241	141	147	87	11	109	141	279
RTOR Reduction (vph)	0	119	0	0	53	0	0	7	0	0	182	0
Lane Group Flow (vph)	213	260	0	22	329	0	147	91	0	109	238	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.5	12.5		12.5	12.5		11.0	11.0		11.0	11.0	
Effective Green, g (s)	12.5	12.5		12.5	12.5		11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.35	0.35		0.35	0.35	
Clearance Time (s)	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	
Lane Grp Cap (vph)	360	676		362	698		267	639		451	585	
v/s Ratio Prot		0.15			0.19			0.05			0.14	
v/s Ratio Perm	c0.23			0.02			c0.19			0.08		
v/c Ratio	0.59	0.38		0.06	0.47		0.55	0.14		0.24	0.41	
Uniform Delay, d1	7.5	6.8		5.9	7.0		8.3	7.0		7.3	7.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	0.4		0.1	0.5		2.4	0.1		0.3	0.5	
Delay (s)	10.1	7.1		5.9	7.6		10.7	7.1		7.6	8.2	
Level of Service	B	A		A	A		B	A		A	A	
Approach Delay (s)		8.2			7.5			9.3			8.1	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.1			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		31.5			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		73.9%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

8: Kuihelani Hwy & Waiko Rd

10/13/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	247	90	100	630	700	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	271	99	110	692	769	522
RTOR Reduction (vph)	0	73	0	0	0	334
Lane Group Flow (vph)	271	26	110	692	769	188
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	15.9	15.9	5.3	32.5	22.2	22.2
Effective Green, g (s)	15.9	15.9	5.3	32.5	22.2	22.2
Actuated g/C Ratio	0.26	0.26	0.09	0.53	0.36	0.36
Clearance Time (s)	6.8	6.8	5.0	6.3	6.3	6.3
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	457	409	152	1870	1277	571
v/s Ratio Prot	c0.15		c0.06	0.20	c0.22	
v/s Ratio Perm		0.02				0.12
v/c Ratio	0.59	0.06	0.72	0.37	0.60	0.33
Uniform Delay, d1	20.0	17.2	27.4	8.5	16.0	14.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.0	13.4	0.1	0.8	0.3
Delay (s)	21.3	17.2	40.8	8.6	16.9	14.6
Level of Service	C	B	D	A	B	B
Approach Delay (s)	20.2			13.0	15.9	
Approach LOS	C			B	B	

Intersection Summary

HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	18.1
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

LOS Worksheets – Year 2026 with Project with Mitigation (LOS D or Better) Conditions

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	667	70	171	453	400	140	587	262	250	244	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	1.00
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)	1768	3539	1549	1769	3539	1543	1770	1863	1558	1769	1748	1748
Flt Permitted	0.33	1.00	1.00	0.21	1.00	1.00	0.32	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	614	3539	1549	386	3539	1543	603	1863	1558	240	1748	1748
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	388	695	73	178	472	417	146	611	273	260	254	177
RTOR Reduction (vph)	0	0	54	0	0	154	0	0	182	0	28	0
Lane Group Flow (vph)	388	695	19	178	472	263	146	611	91	260	403	0
Confl. Peds. (#/hr)	3		1	1		3			4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	32.8	22.8	22.8	29.6	21.2	21.2	34.1	29.1	29.1	38.1	31.1	
Effective Green, g (s)	32.8	22.8	22.8	29.6	21.2	21.2	34.1	29.1	29.1	38.1	31.1	
Actuated g/C Ratio	0.38	0.26	0.26	0.34	0.24	0.24	0.39	0.33	0.33	0.44	0.36	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	362	924	404	263	859	374	302	621	519	227	622	
v/s Ratio Prot	c0.12	0.20		0.06	0.13		0.03	0.33		c0.09	0.23	
v/s Ratio Perm	c0.28		0.01	0.16		0.17	0.16		0.06	c0.41		
v/c Ratio	1.07	0.75	0.05	0.68	0.55	0.70	0.48	0.98	0.18	1.15	0.65	
Uniform Delay, d1	24.6	29.7	24.1	21.9	28.9	30.2	18.4	28.9	20.6	21.2	23.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	67.7	3.5	0.0	5.3	0.7	5.9	0.4	31.8	0.2	104.5	2.3	
Delay (s)	92.4	33.1	24.2	27.3	29.6	36.1	18.9	60.7	20.8	125.8	25.9	
Level of Service	F	C	C	C	C	D	B	E	C	F	C	
Approach Delay (s)		52.5			31.8			44.2			63.4	
Approach LOS		D			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			46.6									
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			87.3									
Intersection Capacity Utilization			95.3%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	189	490	160	70	488	230	250	653	80	120	503	195
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	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1767	1783		1770	1863	1546	1762	1832		1770	1863	1545
Flt Permitted	0.28	1.00		0.18	1.00	1.00	0.31	1.00		0.16	1.00	1.00
Satd. Flow (perm)	514	1783		339	1863	1546	573	1832		298	1863	1545
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	516	168	74	514	242	263	687	84	126	529	205
RTOR Reduction (vph)	0	22	0	0	0	89	0	8	0	0	0	109
Lane Group Flow (vph)	199	662	0	74	514	153	263	763	0	126	529	96
Confl. Peds. (#/hr)	2		3	3		2	12					12
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	22.0	22.0		22.0	22.0	22.0	25.0	25.0		25.0	25.0	25.0
Effective Green, g (s)	22.0	22.0		22.0	22.0	22.0	25.0	25.0		25.0	25.0	25.0
Actuated g/C Ratio	0.40	0.40		0.40	0.40	0.40	0.45	0.45		0.45	0.45	0.45
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	205	713		135	745	618	260	832		135	846	702
v/s Ratio Prot		0.37			0.28			0.42			0.28	
v/s Ratio Perm	c0.39			0.22		0.10	c0.46			0.42		0.06
v/c Ratio	0.97	0.93		0.55	0.69	0.25	1.01	0.92		0.93	0.63	0.14
Uniform Delay, d1	16.2	15.8		12.7	13.7	11.0	15.0	14.0		14.2	11.4	8.7
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	54.2	18.3		4.5	2.7	0.2	58.8	14.7		57.1	1.5	0.1
Delay (s)	70.4	34.1		17.2	16.4	11.2	73.8	28.7		71.3	12.9	8.8
Level of Service	E	C		B	B	B	E	C		E	B	A
Approach Delay (s)		42.3			14.9			40.2			20.5	
Approach LOS		D			B			D			C	
Intersection Summary												
HCM 2000 Control Delay		30.2										
HCM 2000 Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		55.0										
Intersection Capacity Utilization		98.7%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Waiale Rd & Kuikahi Drive/Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	506	80	215	720	400	30	287	157	360	526	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	1.00
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	1543	1768	3539	1583	1769	1863	1563	1769	1795	1795
Flt Permitted	0.17	1.00	1.00	0.33	1.00	1.00	0.16	1.00	1.00	0.35	1.00	1.00
Satd. Flow (perm)	323	3539	1543	616	3539	1583	294	1863	1563	649	1795	1795
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	522	82	222	742	412	31	296	162	371	542	152
RTOR Reduction (vph)	0	0	60	0	0	290	0	0	115	0	11	0
Lane Group Flow (vph)	205	522	22	222	742	122	31	296	47	371	683	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	NA
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	30.2	23.1	23.1	30.2	23.1	23.1	27.0	25.3	25.3	41.4	34.7	
Effective Green, g (s)	30.2	23.1	23.1	30.2	23.1	23.1	27.0	25.3	25.3	41.4	34.7	
Actuated g/C Ratio	0.35	0.27	0.27	0.35	0.27	0.27	0.31	0.29	0.29	0.48	0.40	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	231	944	411	309	944	422	120	544	456	453	719	
v/s Ratio Prot	c0.07	0.15		0.06	0.21		0.01	0.16		c0.10	c0.38	
v/s Ratio Perm	c0.24		0.01	0.19		0.08	0.07		0.03	0.29		
v/c Ratio	0.89	0.55	0.05	0.72	0.79	0.29	0.26	0.54	0.10	0.82	0.95	
Uniform Delay, d1	22.5	27.3	23.6	22.1	29.5	25.2	22.8	25.8	22.4	16.9	25.1	
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	30.2	0.7	0.1	6.5	4.4	0.4	0.4	1.1	0.1	10.5	21.7	
Delay (s)	52.7	28.0	23.7	28.6	33.8	25.6	23.3	26.9	22.5	27.4	46.8	
Level of Service	D	C	C	C	C	C	C	C	C	C	D	
Approach Delay (s)		33.8			30.5			25.2			40.1	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			33.3									
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			86.6									
Intersection Capacity Utilization			87.6%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: S. Kamehameha Ave & Maui Lani Pkwy

10/13/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	271	523	170	30	555	90	130	410	40	100	503	351
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	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1785		1769	1863	1583	1768	1838		1770	1863	1561
Flt Permitted	0.32	1.00		0.21	1.00	1.00	0.25	1.00		0.28	1.00	1.00
Satd. Flow (perm)	595	1785		384	1863	1583	457	1838		525	1863	1561
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	277	534	173	31	566	92	133	418	41	102	513	358
RTOR Reduction (vph)	0	23	0	0	0	46	0	7	0	0	0	166
Lane Group Flow (vph)	277	684	0	31	566	46	133	452	0	102	513	192
Confl. Peds. (#/hr)			1	1			2					2
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	24.4	24.4		24.4	24.4	24.4	16.3	16.3		16.3	16.3	16.3
Effective Green, g (s)	24.4	24.4		24.4	24.4	24.4	16.3	16.3		16.3	16.3	16.3
Actuated g/C Ratio	0.50	0.50		0.50	0.50	0.50	0.33	0.33		0.33	0.33	0.33
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	298	894		192	933	793	152	615		175	623	522
v/s Ratio Prot		0.38			0.30			0.25			0.28	
v/s Ratio Perm	c0.47			0.08		0.03	c0.29			0.19		0.12
v/c Ratio	0.93	0.76		0.16	0.61	0.06	0.88	0.73		0.58	0.82	0.37
Uniform Delay, d1	11.3	9.8		6.6	8.7	6.2	15.2	14.3		13.4	14.9	12.3
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	33.7	3.9		0.4	1.1	0.0	38.8	4.5		4.9	8.7	0.4
Delay (s)	45.0	13.8		7.0	9.8	6.3	54.1	18.8		18.3	23.5	12.7
Level of Service	D	B		A	A	A	D	B		B	C	B
Approach Delay (s)		22.6			9.2			26.7			19.0	
Approach LOS		C			A			C			B	
Intersection Summary												
HCM 2000 Control Delay		19.4										
HCM 2000 Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		48.7										
Intersection Capacity Utilization		91.2%										
Analysis Period (min)		15										
c Critical Lane Group												

APPENDIX C: RELATED PROJECTS

Residential Projects Status Report

Applicant	Acres	Tax Map Key	SF Units	MF Units	Visitor Units
Maui -- Central					
<i>Committed *</i>					
<u>'Aina o Kane Condos</u>					
A&B Properties	0	3-7-005:003,11,23	0	100	0
<u>Hale Mua</u>					
Sterling Kim	240	3-3-002:031	466	0	0
<u>Imi Ikena Affordable Rentals</u>					
Elleair Hawai'i Inc., sold 2009, now CHP Matt Slepian	0.76	3-8-037:028	0	28	0
<u>Kahawai Condos</u>					
Habitat For Humanity, Sherri Dodson	0.257	2-3-4-033:002	0	16	0
<u>Kahului Town Center Redevelopment</u>					
A & B Properties	17	3-7-007:005,8,9,10,27,50	0	442	0
<u>Kehalani (C-12)</u>					
Kehalani Mauka LLC	28	3-5-001:067	150	0	0
<u>Kehalani (C-13)</u>					
Kehalani Mauka LLC	11	3-5-001:067	0	77	0
<u>Kehalani (C-14)</u>					
Kehalani Mauka LLC	20	3-5-001:067	80	0	0
<u>Kehalani (C-18)</u>					
Kehalani Mauka LLC	9.23		0	83	0
<u>Kehalani (C-19)</u>					
Kehalani Mauka LLC	16.77		76	0	0
<u>Kehalani (C-3)</u>					
Kehalani Mauka LLC	10	3-5-001:067	30	0	0
<u>Kehalani (C-6)</u>					
Kehalani Mauka LLC	16	3-5-001:067	0	80	0
<u>Kehalani (C-7)</u>					
Kehalani Mauka LLC	10	3-5-001:067	35	0	0
<u>Kehalani (C-8)</u>					
Kehalani Mauka LLC	14	3-5-001:067	0	84	0
<u>Kehalani (C-9)</u>					
Kehalani Mauka LLC	26	3-5-001:067	90	0	0
<u>Kehalani Ho'olea Terrace</u>					
Kehalani Mauka LLC	12.25		0	112	0
<u>Kehalani Wai'olu Estates</u>					
Kehalani Mauka LLC	23.72		60	0	0

<u>Applicant</u>	<u>Acres</u>	<u>Tax Map Key</u>	<u>SF Units</u>	<u>MF Units</u>	<u>Visitor Units</u>
<u>Maui Beach Hotel Addition</u>					
KI Concepts Eric Matsuda	0	3-7-003:007,9	0	0	136
<u>Maui Lani Lot 4</u>					
D.R.Horton Schuler Homes	13.8	3-8-007:109,130 (por)	0	238	0
<u>Maui Lani The Fairways</u>					
Maui Lani Homes, LLC; DR Horton/Schuller Homes	13	3-8-007:141	50	0	0
<u>Maui Lani The Parkways</u>					
Maui Lani Homes, LLC; DR Horton/Schuller Homes	45.168	3-8-007:141	225	0	0
<u>Maui Lani Traditions</u>					
Maui Lani 100	20	3-8-007:131	153	0	0
<u>Maui Lani Village</u>					
Maui Lani 100 LLC	0	3-8-007:151,152,155(por)	79	0	0
<u>Mission Street Affordable Apts.</u>					
Kahealani LTD Part., Joseph Kealoha, CHP	0.92	234-018:088	0	10	0
<u>Pi'ihana Project District 2</u>					
Hawaii Land & Farming Co. Inc., Jay Nakamura	78	3-4-032:1,10,18. 3-4-7:2. 3- 3-1:16,33.	95	440	0
<u>Waikapu Gardens II</u>					
Spencer Homes	10.5	235-002:016	56	0	
<i>MIP and CP *</i>					
<u>Habitat For Humanity Condos</u>					
Habitat For Humanity, Sheri Dodson	0.6	3-8-037:047	0	40	0
<u>Ka Lima O Maui Affordable Housing</u>					
Ka Lima O Maui, County of Maui, Munekiyo & Hiraga Inc.	2	2-3-8-046:016	0	16	0
<u>Maui Lani Homes 1</u>					
Maui Lani 100	40	3-8-007:130	240	0	0
<u>Maui Lani Lot 7B</u>					
DR Horton; Schuler homes	24.879	3-8-007:141	120	0	0
<u>Maui Lani MF7 Condos</u>					
Maui Lani 100	16	3-8-007:130	0	68	0
<u>Waikapu Mauka Country Town</u>					
Mike Atherton	115	3-6-002:003	228	195	0
<u>Waikapu Mauka Rural Lots</u>					
THP Assoc., Waikapu Mauka Partners	288	236-004:004,5,9,13	304	0	0
<i>MIP Only *</i>					
<u>Pu'unani Residences</u>					
Towne Dev of Hawaii, Endurance Investors, II Wai Hui	210	3-5-002:002,3	150	450	0

Applicant	Acres	Tax Map Key	SF Units	MF Units	Visitor Units
<u>Wai'ale</u>					
A & B Properties	826	3-8-007:101,102,104,105,71, 3-8-005:023,37	1127	1127	0
<u>Wai'ale Affordable Homes</u>					
A & B Properties	50	3-8-007:101	0	300	0
<u>Waikapu Makai Village</u>					
Mike Atherton, Maui Tropical Plantation	225	3-6-002:003(por)	468	513	0
<u>Waikapu Rural Village</u>					
Mike Atherton	23	3-6-004:003	29	0	0

* Definitions of Status Categories:

The development projects shown are those projects that have come to the attention of the Department of Planning. There are certain to be other developments being contemplated or planned by private individuals or corporations of which the Department has not been informed. Further, the Department is not attempting to track housing projects smaller than 6 dwelling units and subdivisions of less than 4 lots. Therefore, this is not a complete depiction of the development projects for the county.

Projects identified as "Committed" have inclusion in the Maui Island Plan Growth Boundaries and generally have conforming Community Plan and zoning entitlements; or are approved 201G/H projects. "Committed" refers to the status of the land relative to the primary county land use entitlements, but is in no way intended to convey the level of commitment by the land owner or the developer to proceed with development or convey any time frame for development.

Projects identified as "MIP and CP" have inclusion in the Maui Island Plan Growth Boundaries and the appropriate urban or rural Community Plan designations but not the conforming zoning entitlements to proceed.

Projects identified as "MIP Only" do have inclusion in the Maui Island Plan Growth Boundaries but do not have the appropriate Community Plan designation nor zoning to proceed.

Projects identified as "Agricultural Subdivisions" are projects permitted through Maui County Code 19.30A Agricultural District Ordinance.

Projects identified as "DHHL Near Term" are Department of Hawaiian Homelands (DHHL) projects planned to be initiated within the current planning horizon.

Projects identified as "DHHL Long Term" are Department of Hawaiian Homelands (DHHL) projects with projections beyond the current planning horizon.

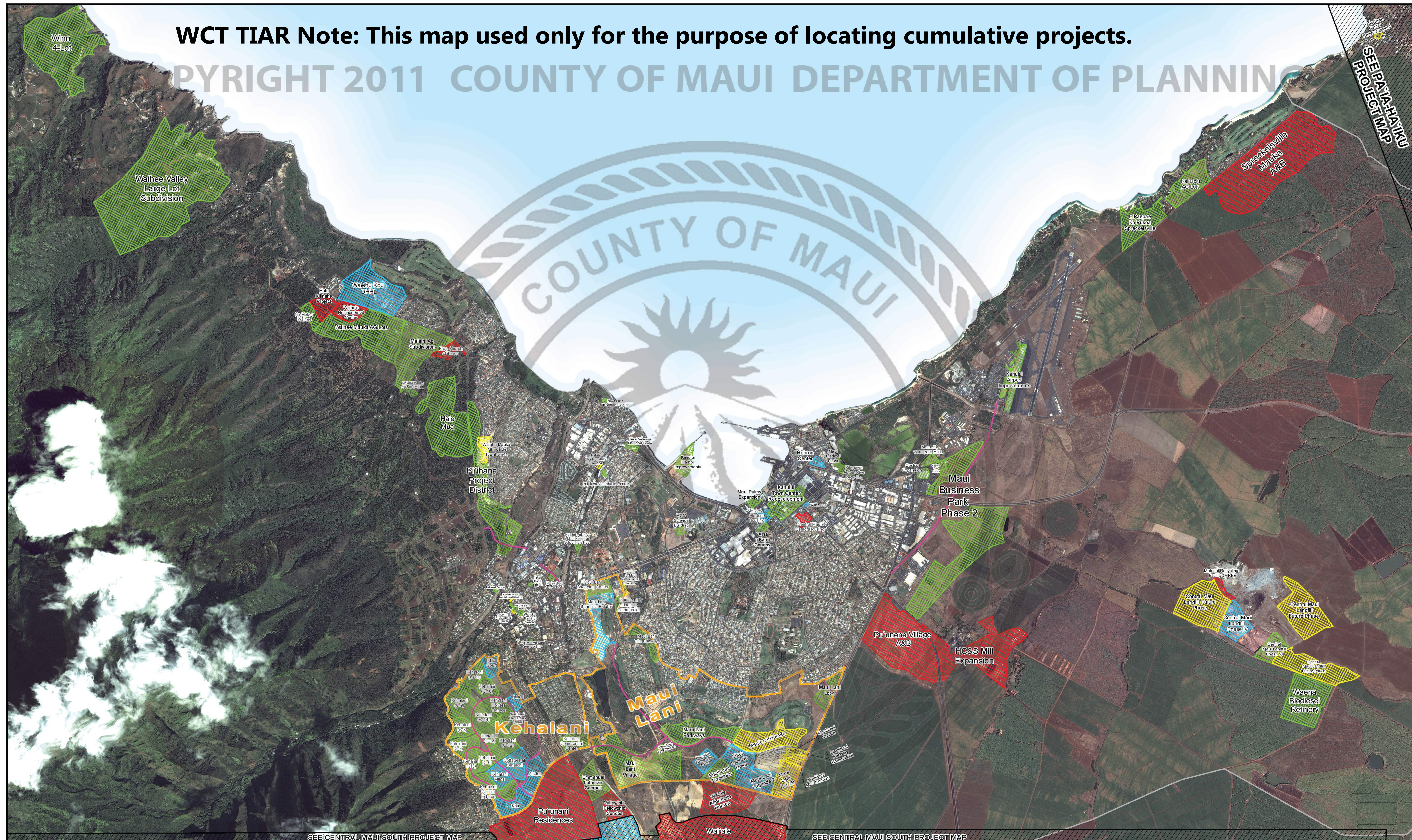
Projects identified as "Recently Completed" include those where the subdivision process is complete, total build-out of the project has been reached or nearly reached, and real property is being actively marketed. These projects remain "Recently Completed" until other map layers show the completed project.

Lastly, the classifications above are in reference to the general level of county land use entitlements for the entire project. Project plans frequently change over time, and specific portions of the projects may gain or lose conformity in the process. Also, state entitlement and various county permits may be required before all or particular portions of a project can be developed. Please consult with the Department of Planning's Zoning Administration and Enforcement Division to confirm Maui Island Plan, Community Plan, Zoning and other land use entitlements.

Planned/Designated			
Church Street Professional Center	0	8	0
Habitat For Humanity Condos	0	40	0
Hale Ho omahu Mental Health Koaia	0	8	0
Ka Lima O Maui Affordable Housing	0	16	0
Maui Lanii Homes 1	240	0	0
Maui Lanii Lot 18	720	0	0
Maui Lanii MFT Condos	0	68	0
Waiehu Koaia Affordable Townhomes	0	100	0
SUB-TOTAL	360	236	0
Financed			
Central Maui Senior Housing	0	36	0
Hale Kihuna Project	80	0	0
Pu Unani Residences	276	476	0
Pu Unani Village A&B	1,200	0	0
Sprockelsville Maui Condos	380	0	0
Valley Isle Fellowship Condos	0	100	0
Wailele Affordable Homes	300	300	0
Waiehu Neighborhood Center	25	82	0
SUB-TOTAL	2,361	992	0
TOTAL	4,318	2,961	276

Projects identified as "Planned/Committed" have the appropriate conforming Community Plan and zoning entitlements, are approved agricultural subdivisions or approved 201GH projects, or are Department of Hawaiian Homelands (DHHL) projects. Projects identified as "Planned/Designated" have urban or rural Community Plan designations but not the conforming zoning entitlements to proceed. Projects identified as "Proposed" are currently lacking urban or rural Community Plan designations. Projects identified as "Recently Completed" are those where the proposed project is complete, total build-out of the project has been reached or nearly reached, and real property is being actively marketed. Further, these projects remain "Recently Completed" until other map layers show the completed project.

COPYRIGHT 2011 COUNTY OF MAUI DEPARTMENT OF PLANNING



Waihe'e to Maui Lani

 Recently Completed
 Planned/Committed
 Planned/Designated
 Proposed
 Proposed Roads
 Phased Development
 Community Plan Area Boundaries



Includes material © 2005 DigitalGlobe, Inc.
ALL RIGHTS RESERVED.

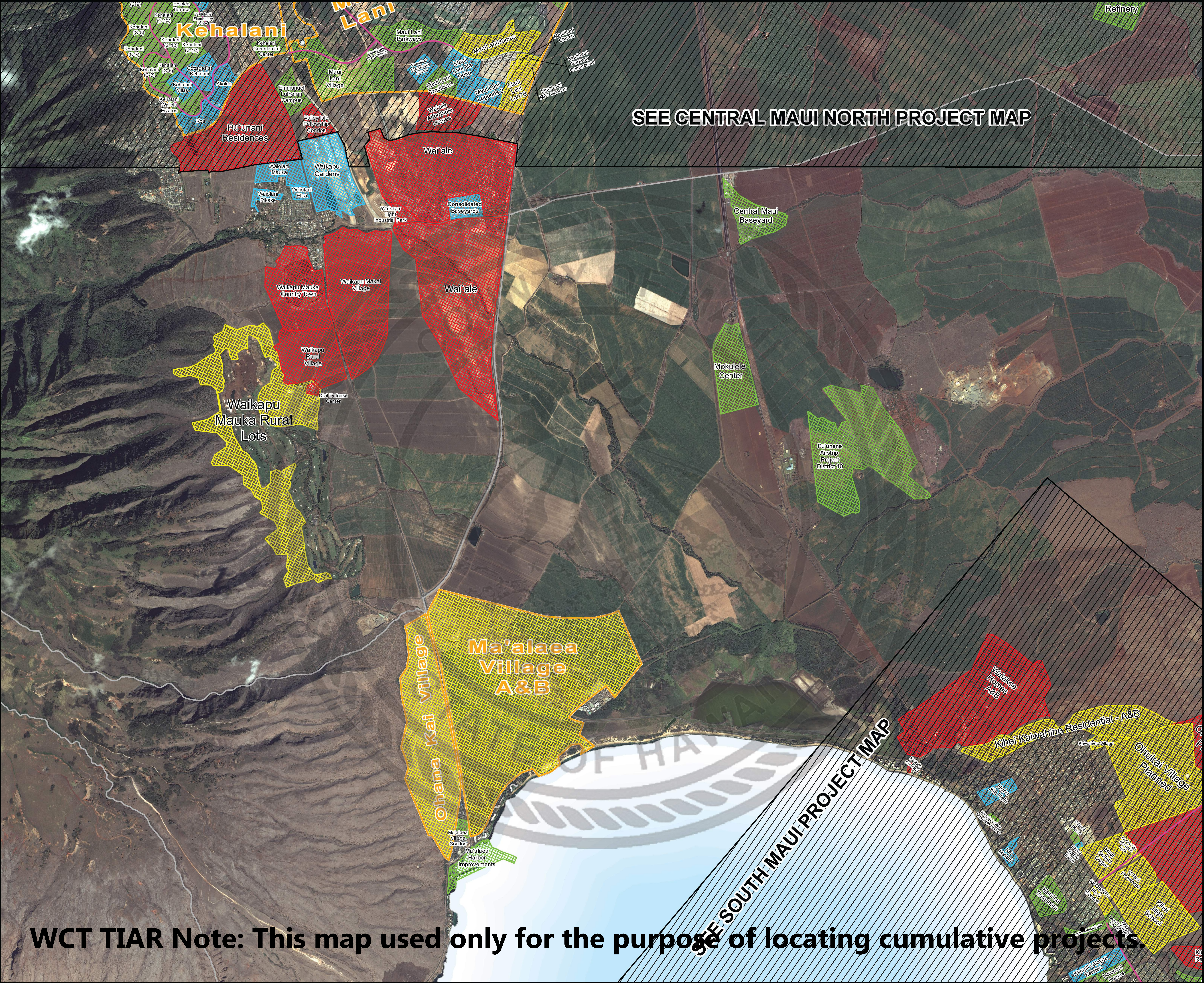
This is not a zoning map or community plan map. Please contact the Planning Department for Zoning and Community Plan information.



Projects by Geographic Map Extent	Unit Types			Time Share and Hotel
	Single Family	Multi Family		
Recently Completed				
Waikapu Gardens	410	0	0	
Waioani Elua	25	0	0	
Waioani Mauka	104	0	0	
Waioani Pikake	38	0	0	
TOTAL	577	0	0	
Planned/Committed				
Ma'alaea Village Condos	0	100	0	
SUB-TOTAL	0	100	0	
Planned/Designated				
Ma'alaea Village A&B Project District 11	2,000	0	0	
Ohana Kai Village Project District 12	1,100	0	0	
Waikapu Mauka Rural Lots	304	0	0	
SUB-TOTAL	3,404	0	0	
Proposed				
Waialeale	1,065	2,715	0	
Waikapu Mauka Village	468	513	0	
Waikapu Mauka Country Town	228	195	0	
Waikapu Rural Village	29	0	0	
SUB-TOTAL	1,790	3,423	0	
TOTAL	5,194	3,523	0	

The development projects shown are those that have come to the attention of the Department of Planning. There are certain to be other developments being contemplated or planned by private individuals or corporations of which the Department has not been informed. Further, the Department is not attempting to track housing projects smaller than 6 dwelling units and subdivisions of less than 4 lots. Therefore, this is not a complete depiction of the development projects for the county.

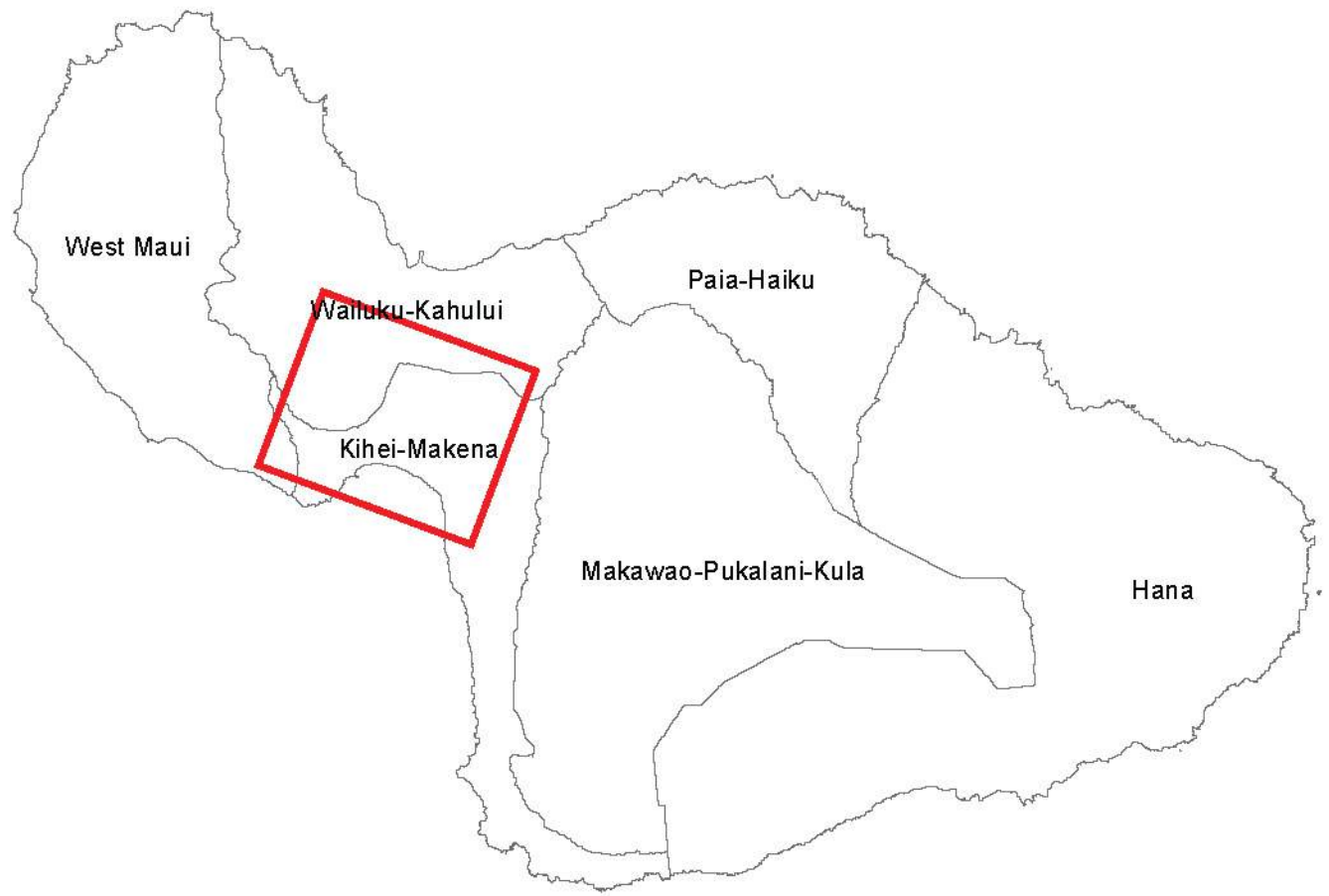
Projects identified as "Planned/Committed" have the appropriate conforming Community Plan and zoning entitlements, are approved agricultural subdivisions, are approved 2010/H projects, or are Department of Hawaiian Homelands (DHHL) projects. Projects identified as "Planned/Designated" have urban or rural Community Plan designations but not the conforming zoning entitlements to proceed. Projects identified as "Proposed" are currently lacking urban or rural Community Plan designations. Projects identified as "Recently Completed" include those where the subdivision process is complete, total build-out of the project has been reached or nearly reached, and real property is being actively marketed. Further, these projects remain "Recently Completed" until other map layers show the completed project.



WCT TIAR Note: This map used only for the purpose of locating cumulative projects.

Central Maui South Development Projects
Maui Lani to Ma'alaea

- Legend
- Development Projects
- Growth Classes
- Recently Completed
 - Planned/Committed
 - Planned/Designated
 - Proposed
- Proposed Roads
- Phased Development
- Community Plan Area Boundaries

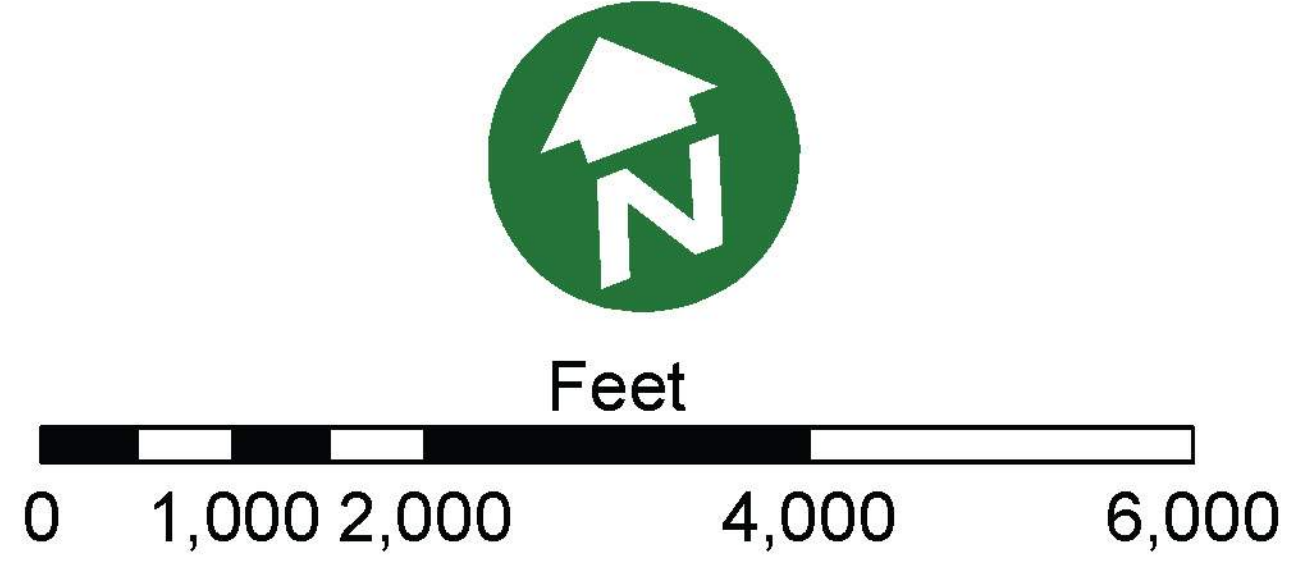


LOCATION MAP

Copyright © February 15, 2011
All rights reserved. No part of this product shall be modified without prior written approval from the Planning Department. For information regarding this product please contact the GIS section, Long Range Division, Maui County Planning Department. Copies of this product are available from the Long Range Division for a fee.
Product Code: M-JKG/CET_20110215-B

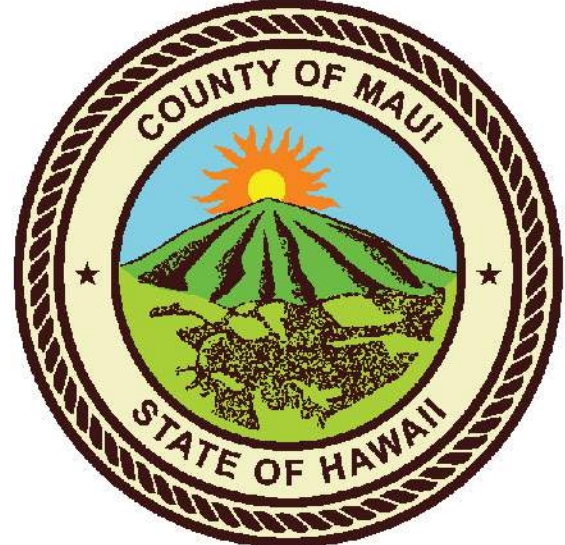
Includes material © 2005 DigitalGlobe, Inc.
ALL RIGHTS RESERVED.

This is not a zoning map or community plan map. Please contact the Planning Department for Zoning and Community Plan information.



PREPARED BY:

Long Range Planning Division
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793



CENTRAL MAUI RELATED PROJECTS COMPLETED BY YEAR 2013 ^{1,2}

Project Name
• Church Street Professional Center
• Imi Ikena Affordable Rentals
• Kehalani Akolea
• Kehalani Cottages
• Kehalani Koa
• Kehalani Ho'olea Terrace
• Kehalani Milo Court
• Kehalani Ohia II
• Kehalani Villas
• Kehalani Wai'olu Estates
• Maui Lani LDS Church
• Maui Lani Legends 2
• Maui Lani Na Hoku
• Maui Lani Sandhills Estates
• Maui Lani Sandhills - Commercial
• Maui Lani Shopping Center
• Maui Lani The Fairways
• Maui Lani Traditions
• Nisei Veterans Memorial Center
• Pomaikai Elementary School
• Waikapu Gardens
• Wailuku 2 Elementary School
• Waiolani Elua
• Waiolani Mauka
• Waiolani Pikake
• Walgreens
<u>Notes:</u> ¹The list above of development projects in Central Maui were pulled from multiple sources, including: conversations with County staff and developers, a residential project list for Central Maui provided by the County of Maui in December 2013, available and relevant environmental assessments or impact studies available on the State's website for Maui, and the 2011 Central Maui Development Project maps and Development Project GIS layer available on the County website. ²During the related project review process, the projects listed above were found to have been completed. The socioeconomic and land use data in the TDFM Base Year (2007) was reviewed and in some areas adjusted to appropriately model the above related projects and to further update the Base Year (2007) model to a Base Year (2013) model.

APPENDIX D: MXD+ WORKSHEETS

MXD+ Worksheets – Year 2022 Phase 1 Project Conditions

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs

Regular inputs (project-specific)

Inputs that may depend on regional values from census data, travel demand model, etc...

Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name	Waikapu Country Town Phase 1 (2017-2021)	int/sq mi	50
Geographic	Notes / Instructions		
Developed Area (in acres)	244.72	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.	
Number of Intersections	19	Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above	
Is Transit (bus or rail) present within the site or across the street?	Yes	Note: This is only used as a way to zero out the probability of external trips if no transit is present.	
Proportion of households within 1/4 mile of a transit stop	25%	Enter as a percentage	
<u>Land Use - Surrounding Area</u>			
Is the site in a Central Business District and/or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.	
Employment within one mile of the MXD	3,503	Do not include employment within the MXD itself	
Employment within a 30 minute Transit Trip (Door-to-door)	7,686	Include employment within the MXD itself	
Total Regional Employment	90,855	Employment at MPO or similar level	

Site Demographics

Enter Population Directly?	No	If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2	
Population		You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.	
Average HH Size by type within MXD		These HH size inputs by dwelling type are used to calculate population if it is not entered above, and are also used for average HH size if block group average HH size option is "No" below	
Single Family	3.2		
Multi-Family	2.5		
Townhouse	2.5		
High Rise Condo	2.5		
Average Vehicles Owned per Dwelling Unit within site	2.70		

Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?	Yes	If no project-specific information exists, can use block group average HH size (see below)
Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?	Yes	If no project-specific information exists, can use block group average veh owned (see below)

Surrounding Area (Block Group) Demographics

Average HH size near Site	3.37	See http://factfinder2.census.gov/
Average Vehicles Owned per Dwelling Unit near Site	2.07	See http://factfinder2.census.gov/

Section 2 - Trip Generation

				Trip Equation Method			Trips		NHB Trips Outside of Project				
				Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour	
				Quantity	Units								
Number of Dwelling Units	Single Family	347	DU	Log Equation	Linear Equation	Log Equation	3,299	253	322	699	11	65	
	Multi-Family	384	DU	Linear Equation	Linear Equation	Linear Equation	2,451	192	229	773	12	71	
	Townhouse	0	DU	Log Equation	Log Equation	Log Equation	0	0	0	0	0	0	
	High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0	0	0	0	
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)													
General Retail other than those listed below	Supermarket	0	ksf	Log Equation	Log Equation	Log Equation	9,573	215	854				
	Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Home Improvement Superstore		ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Free-Standing Discount		ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Office	Non-Medical	0	ksf	Log Equation	Log Equation	Linear Equation	0	0	0			
		Medical	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Industrial	Light Industrial	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
	Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0				
Hotel (including restaurant, facilities, etc...)		0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0				
	Motel		Rooms	Average Rate	Average Rate	Average Rate	0	0	0				
	Movie Theater (Theater with Matinee)			Average Rate	Average Rate	Average Rate	0	0	0				
	Movie Theater (Multiplex)	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0				
School	University		Students	Linear Equation	Average Rate	Average Rate	0	0	0				
	High School		Students	Average Rate	Average Rate	Average Rate	0	0	0				
	Middle School		Students	Average Rate	Average Rate	Average Rate	0	0	0				
	Elementary	750	Students	Average Rate	Average Rate	Average Rate	968	338	113				
Trips from Land uses not covered above ==>													
Jobs in those Land Uses	Daily	61	Park related trips										
	AM Peak Hour	1	Park related trips										
	PM Peak Hour	2	Park related trips										
		0											
				Daily	AM Peak Hour	PM Peak Hour	16,351	998	1,519				
Total "Raw" ITE Trips													

MIXED USE TRIP GENERATION MODEL - ADVANCED OUTPUT

MODEL APPLICATION - ALL TRIPS

Number of "Raw" ITE Trips Subject to Model	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
<i>Productions</i>	1263	3203	1475	5940	192	104	53	349	167	258	149	575
<i>Attractions</i>	1016	6897	1824	9736	82	293	59	434	126	558	186	871
<i>Total</i>	2278	10099	3298	15676	274	397	112	783	293	817	335	1445
Predicted Probabilities:												
<i>Productions</i>												
Internal Capture	5.30%	10.35%	9.68%	12.49%	7.16%	14.06%	13.20%	12.91%	10.00%	19.62%	18.42%	21.92%
Walking External	3.17%	2.07%	0.51%	1.93%	4.19%	2.73%	0.51%	3.27%	3.17%	2.07%	0.51%	2.03%
Transit External	0.52%	1.08%	5.44%	2.05%	0.74%	2.33%	11.70%	2.80%	0.81%	2.16%	10.88%	4.00%
<i>Attractions</i>												
Internal Capture	5.30%	10.35%	9.68%	7.62%	7.16%	14.06%	13.20%	10.36%	10.00%	19.62%	18.42%	14.47%
Walking External	3.17%	2.07%	0.51%	1.90%	4.19%	2.73%	0.51%	2.70%	3.17%	2.07%	0.51%	1.91%
Transit External	0.52%	1.08%	5.44%	1.83%	0.74%	2.33%	11.70%	3.29%	0.81%	2.16%	10.88%	3.78%
<i>Total</i>												
Internal Capture	5.27%	10.34%	9.70%	9.47%	7.30%	14.12%	12.45%	11.50%	10.23%	19.59%	18.49%	17.43%
Walking External	3.17%	2.07%	0.51%	1.91%	4.19%	2.73%	0.51%	2.95%	3.17%	2.07%	0.51%	1.96%
Transit External	0.52%	1.08%	5.44%	1.91%	0.74%	2.33%	11.70%	3.08%	0.81%	2.16%	10.88%	3.86%
Number of Trips:												
<i>Productions</i>												
Internal Capture	60	522	160	742	10	28	7	45	15	80	31	126
Walking External	38	56	7	100	8	2	0	10	5	4	1	9
Transit External	6	29	72	107	1	2	5	9	1	4	13	18
<i>Attractions</i>												
Internal Capture	60	522	160	742	10	28	7	45	15	80	31	126
Walking External	30	132	8	171	3	7	0	11	4	10	1	14
Transit External	5	69	91	164	1	6	6	13	1	10	17	28
<i>Total</i>												
Internal Capture	120	1044	320	1484	20	56	14	90	30	160	62	252
Walking External	68	188	15	271	11	9	1	20	8	14	1	23
Transit External	11	98	162	271	2	8	12	21	2	14	30	46
Internal Capture including Site Specific Internal	190	1589	320	2099	44	246	14	304	38	223	62	323
Net Number of IXXI Vehicle Trips	2079	8770	2801	13649	241	323	86	651	253	629	242	1124
Results	External Vehicle Trips				VMT							
	Raw	Net	Reduction %		Raw	Net	Reduction %					
Daily	16,351	13,649	17%		61,319	52,259	15%					
AM Peak Hour	998	651	35%		4,235	2,990	29%					
PM Peak Hour	1,519	1,124	26%		5,974	4,601	23%					

NOTE: External trips are attributed half to project site uses,
internal trips all to site uses for purposes of VMT allocation.
NHB Trips by households that start and end outside the site are not included.

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH
HOUSES IN THE PROJECT ONLY

Number of "Raw" ITE Trips Subject to Model	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
<i>Productions</i>	1263	3203	0	4465	192	104	0	295	167	258	0	426
<i>Attractions</i>	-35	356	349	670	-12	-59	6	-65	-4	21	37	54
<i>Total</i>	1228	3558	349	5135	180	44	6	230	163	279	37	479
Predicted Probabilities:												
<i>Productions</i>												
Internal Capture	5.30%	10.35%	9.68%	12.49%	7.16%	14.06%	13.20%	12.91%	10.00%	19.62%	18.42%	21.92%
Walking External	3.17%	2.07%	0.51%	1.93%	4.19%	2.73%	0.51%	3.27%	3.17%	2.07%	0.51%	2.03%
Transit External	0.52%	1.08%	5.44%	2.05%	0.74%	2.33%	11.70%	2.80%	0.81%	2.16%	10.88%	4.00%
<i>Attractions</i>												
Internal Capture	5.30%	10.35%	9.68%	7.62%	7.16%	14.06%	13.20%	10.36%	10.00%	19.62%	18.42%	14.47%
Walking External	3.17%	2.07%	0.51%	1.90%	4.19%	2.73%	0.51%	2.70%	3.17%	2.07%	0.51%	1.91%
Transit External	0.52%	1.08%	5.44%	1.83%	0.74%	2.33%	11.70%	3.29%	0.81%	2.16%	10.88%	3.78%
<i>Total</i>												
Internal Capture	-5.67%	10.34%	0.00%	5.81%	-13.52%	-266.39%	0.00%	-61.95%	-4.96%	14.87%	0.00%	6.97%
Walking External	3.17%	2.07%	0.51%	2.25%	4.19%	2.73%	0.51%	3.49%	3.17%	2.07%	0.51%	2.36%
Transit External	0.52%	1.08%	5.44%	1.25%	0.74%	2.33%	11.70%	1.61%	0.81%	2.16%	10.88%	2.36%
Number of Trips:												
<i>Productions</i>												
Internal Capture	-35	184	0	149	-12	-59	0	-71	-4	21	0	17
Walking External	41	63	0	104	9	4	0	13	5	5	0	10
Transit External	7	33	0	39	2	4	0	5	1	5	0	7
<i>Attractions</i>												
Internal Capture	-35	184	0	149	-12	-59	0	-71	-4	21	0	17
Walking External	0	4	2	5	0	0	0	0	0	0	0	0
Transit External	0	2	19	21	0	0	1	1	0	0	4	4
<i>Total</i>												
Internal Capture	-70	368	0	298	-24	-118	0	-143	-8	42	0	33
Walking External	41	66	2	109	9	4	0	13	5	5	0	11
Transit External	7	35	19	60	2	4	1	6	1	5	4	11
Internal Capture including Site Specific Internal	-35	640	0	606	-12	-23	0	-35	-4	73	0	69
NHB trips occurring outside the project			1472				23				136	
Non-XX NHB trips based on MXD model			143				3				25	
NHB trips still occurring outside the project			1329				20				111	
Net Number of IXXI Vehicle Trips generated by Project Residences	1249	3090	328	4667	194	154	5	354	165	228	33	425
Results	External Vehicle Trips				VMT				VMT Per Household			
	Raw	Net	Reduction %		Raw	Net	Reduction %		Raw	Net		
Daily	5,750	4,667	19%		56,051	48,312	14%		76.7	66.1		
AM Peak Hour	445	354	20%		4,376	3,695	16%		6.0	5.1		
PM Peak Hour	551	425	23%		5,635	4,698	17%		7.7	6.4		

NOTE: all trips generated by project households (either produced or attracted or both)
are counted 100%. This cannot be compared directly to the VMT in the section above.

MXD+ Worksheets – Year 2026 Phase 1 and Phase 2 Project Conditions

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs

Regular inputs (project-specific)

Inputs that may depend on regional values from census data, travel demand model, etc...

Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name
Waikapu Country Town
Phase 1 & 2 (2017-2026)

int/sq mi
40

Geographic

Developed Area (in acres)

Number of Intersections

Is Transit (bus or rail) present within the site or across the street?

Proportion of households within 1/4 mile of a transit stop

Notes / Instructions

444,21 Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.

28 Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above

Yes Note: This is only used as a way to zero out the probability of external trips if no transit is present.

25% Enter as a percentage

Land Use - Surrounding Area

Is the site in a Central Business District and/or TOD?

Employment within one mile of the MXD

Employment within a 30 minute Transit Trip (Door-to-door)

Total Regional Employment

Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.

3,743 Do not include employment within the MXD itself

8,089 Include employment within the MXD itself

94,824 Employment at MPO or similar level

Site Demographics

Enter Population Directly?

No If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2

You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.

Average HH Size by type within MXD

Single Family

3.2

Multi-Family

2.5

Townhouse

2.5

High Rise Condo

2.5

These HH size inputs by dwelling type are used to calculate population if it is not entered above, and are also used for average HH size if block group average HH size option is "No" below

Average Vehicles Owned per Dwelling Unit within site

2.70

Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?

Yes If no project-specific information exists, can use block group average HH size (see below)

Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?

Yes If no project-specific information exists, can use block group average veh owned (see below)

Surrounding Area (Block Group) Demographics

Average HH size near Site

3.37

See <http://factfinder2.census.gov/>

Average Vehicles Owned per Dwelling Unit near Site

2.07

See <http://factfinder2.census.gov/>

Section 2 - Trip Generation

				Trip Equation Method			Trips		NHB Trips Outside of Project			
				Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
				Quantity	Units							
Number of Dwelling Units	Single Family	1,050	DU	Log Equation	Linear Equation	Log Equation	9,136	745	872	2,114	33	195
	Multi-Family	529	DU	Linear Equation	Linear Equation	Linear Equation	3,329	263	309	1,065	17	98
	Townhouse	0	DU	Log Equation	Log Equation	Log Equation	0	0	0	0	0	0
	High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0	0	0	0
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)												
	General Retail other than those listed below	169,597	ksf	Log Equation	Log Equation	Log Equation	9,573	215	854			
	Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Home Improvement Superstore		ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Free-Standing Discount		ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Office												
	Non-Medical	0	ksf	Log Equation	Log Equation	Linear Equation	0	0	0			
	Medical	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Industrial												
	Light Industrial	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
	Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0			
Hotel (including restaurant, facilities, etc...)												
	Motel		Rooms	Average Rate	Average Rate	Average Rate	0	0	0			
	Movie Theater (Theater with Matinee)			Average Rate	Average Rate	Average Rate	0	0	0			
	Movie Theater (Multiplex)	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0			
School												
	University		Students	Linear Equation	Average Rate	Average Rate	0	0	0			
	High School		Students	Average Rate	Average Rate	Average Rate	0	0	0			
	Middle School		Students	Average Rate	Average Rate	Average Rate	0	0	0			
	Elementary	750	Students	Average Rate	Average Rate	Average Rate	968	338	113			
Trips from Land uses not covered above ==>												
	Daily	74	Park related trips									
	AM Peak Hour	1	Park related trips									
	PM Peak Hour	3	Park related trips									
Jobs in those Land Uses												

MIXED USE TRIP GENERATION MODEL - ADVANCED OUTPUT

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Number of "Raw" ITE Trips Subject to Model												
<i>Productions</i>	2778	7262	1475	11514	450	355	53	859	363	590	149	1103
<i>Attractions</i>	1016	7630	2231	10878	82	338	67	487	126	618	228	973
<i>Total</i>	3794	14892	3706	22392	532	694	120	1346	489	1208	377	2075
Predicted Probabilities:												
<i>Productions</i>												
Internal Capture	4.42%	10.48%	11.04%	9.28%	6.05%	14.30%	15.11%	8.73%	7.36%	17.42%	18.39%	14.33%
Walking External	2.92%	1.57%	0.46%	1.79%	3.86%	2.08%	0.47%	2.97%	2.92%	1.57%	0.46%	1.93%
Transit External	0.41%	1.13%	5.45%	1.47%	0.59%	2.42%	11.71%	1.93%	0.64%	2.25%	10.89%	2.71%
<i>Attractions</i>												
Internal Capture	4.42%	10.48%	11.04%	9.83%	6.05%	14.30%	15.11%	15.39%	7.36%	17.42%	18.39%	16.24%
Walking External	2.92%	1.57%	0.46%	1.47%	3.86%	2.08%	0.47%	2.14%	2.92%	1.57%	0.46%	1.49%
Transit External	0.41%	1.13%	5.45%	1.95%	0.59%	2.42%	11.71%	3.43%	0.64%	2.25%	10.89%	4.09%
<i>Total</i>												
Internal Capture	4.43%	10.48%	11.06%	9.55%	6.01%	14.42%	14.99%	11.14%	7.36%	17.38%	18.54%	15.23%
Walking External	2.92%	1.57%	0.46%	1.63%	3.86%	2.08%	0.47%	2.68%	2.92%	1.57%	0.46%	1.73%
Transit External	0.41%	1.13%	5.45%	1.70%	0.59%	2.42%	11.71%	2.45%	0.64%	2.25%	10.89%	3.35%
Number of Trips:												
<i>Productions</i>												
Internal Capture	84	780	205	1069	16	50	9	75	18	105	35	158
Walking External	79	102	6	187	17	6	0	23	10	8	1	18
Transit External	11	73	69	153	3	7	5	15	2	11	12	26
<i>Attractions</i>												
Internal Capture	84	780	205	1069	16	50	9	75	18	105	35	158
Walking External	27	108	9	144	3	6	0	9	3	8	1	12
Transit External	4	77	110	191	0	7	7	14	1	12	21	33
<i>Total</i>												
Internal Capture	168	1560	410	2138	32	100	18	150	36	210	70	316
Walking External	106	210	15	331	19	12	0	32	13	16	1	30
Transit External	15	150	180	345	3	14	12	29	3	22	33	59
Internal Capture including Site Specific Internal	238	2105	410	2753	56	290	18	364	44	273	70	387
Net Number of IXXI Vehicle Trips	3505	12972	3101	19578	478	567	90	1135	437	960	273	1670
External Vehicle Trips				VMT								
Results	Raw	Net	Reduction %		Raw	Net	Reduction %					
Daily	23,080	19,578	15%		88,254	76,475	13%					
AM Peak Hour	1,561	1,135	27%		6,908	5,347	23%					
PM Peak Hour	2,150	1,670	22%		8,672	7,000	19%					

NOTE: External trips are attributed half to project site uses,
internal trips all to site uses for purposes of VMT allocation.
NHB Trips by households that start and end outside the site are not included.

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH
HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Number of "Raw" ITE Trips Subject to Model												
<i>Productions</i>	2778	7262	0	10040	450	355	0	805	363	590	0	953
<i>Attractions</i>	-35	1090	757	1812	-12	-14	14	-12	-4	81	79	156
<i>Total</i>	2743	8351	757	11851	438	341	14	793	359	671	79	1109
Predicted Probabilities:												
<i>Productions</i>												
Internal Capture	4.42%	10.48%	11.04%	9.28%	6.05%	14.30%	15.11%	8.73%	7.36%	17.42%	18.39%	14.33%
Walking External	2.92%	1.57%	0.46%	1.79%	3.86%	2.08%	0.47%	2.97%	2.92%	1.57%	0.46%	1.93%
Transit External	0.41%	1.13%	5.45%	1.47%	0.59%	2.42%	11.71%	1.93%	0.64%	2.25%	10.89%	2.71%
<i>Attractions</i>												
Internal Capture	4.42%	10.48%	11.04%	9.83%	6.05%	14.30%	15.11%	15.39%	7.36%	17.42%	18.39%	16.24%
Walking External	2.92%	1.57%	0.46%	1.47%	3.86%	2.08%	0.47%	2.14%	2.92%	1.57%	0.46%	1.49%
Transit External	0.41%	1.13%	5.45%	1.95%	0.59%	2.42%	11.71%	3.43%	0.64%	2.25%	10.89%	4.09%
<i>Total</i>												
Internal Capture	-2.54%	10.49%	0.00%	6.80%	-5.55%	-8.00%	0.00%	-6.51%	-2.25%	17.29%	0.00%	9.73%
Walking External	2.92%	1.57%	0.46%	1.84%	3.86%	2.08%	0.47%	3.03%	2.92%	1.57%	0.46%	1.98%
Transit External	0.41%	1.13%	5.45%	1.24%	0.59%	2.42%	11.71%	1.57%	0.64%	2.25%	10.89%	2.34%
Number of Trips:												
<i>Productions</i>												
Internal Capture	-35	438	0	403	-12	-14	0	-26	-4	58	0	54
Walking External	82	107	0	190	18	8	0	25	11	8	0	19
Transit External	12	77	0	88	3	9	0	12	2	12	0	14
<i>Attractions</i>												
Internal Capture	-35	438	0	403	-12	-14	0	-26	-4	58	0	54
Walking External	0	10	4	14	0	0	0	0	0	0	0	1
Transit External	0	7	41	49	0	0	2	2	0	1	9	9
<i>Total</i>												
Internal Capture	-70	876	0	806	-24	-27	0	-52	-8	116	0	108
Walking External	82	118	4	203	18	8	0	26	11	9	0	20
Transit External	12	84	41	137	3	9	2	13	2	12	9	23
Internal Capture including Site Specific Internal	-35	1148	0	1114	-12	68	0	56	-4	148	0	144
NHB trips occurring outside the project			3179				50				294	
Non-XX NHB trips based on MXD model			351				8				54	
NHB trips still occuring outside the project			2828				42				240	
Net Number of IXXI Vehicle Trips generated by Project Residences	2719	7274	712	10705	442	352	12	806	354	534	70	958
External Vehicle Trips				VMT				VMT Per Household				
Results	Raw	Net	Reduction %		Raw	Net	Reduction %		Raw	Net		
Daily	12,466	10,705	14%		121,445	108,392	11%		76.9	68.6		
AM Peak Hour	1,008	806	20%		9,902	8,435	15%		6.3	5.3		
PM Peak Hour	1,181	958	19%		12,093	10,404	14%		7.7	6.6		

NOTE: all trips generated by project households (either produced or attracted or both)
are counted 100%. This cannot be compared directly to the VMT in the section above.

APPENDIX E: YEAR 2026 PROJECT TRIP GENERATION ESTIMATES

TRIP GENERATION RATES AND ESTIMATES FOR WCT PHASE 1 ONLY

SUMMARY OF RATES										
Land Use	ITE#	Rate	Daily	AM Peak Hour			PM Peak Hour			
				In	Out	Total	In	Out	Total	
Single-Family Housing	210	per Dwelling Unit	[a]	25%	75%	[a]	63%	37%	[a]	
Apartments	220	per Dwelling Unit	[a]	20%	80%	[a]	65%	35%	[a]	
Retail	820	per 1,000 square feet	[a]	62%	38%	[a]	48%	52%	[a]	
Parks	412	per acre	2.28	61%	39%	0.02	61%	39%	0.09	
Elementary School	520	per student	1.29	55%	45%	0.45	49%	51%	0.15	
Quality Restaurant	931	per 1,000 square feet	89.95	82%	18%	0.81	67%	33%	7.49	
Source: ITE Trip Generation Manual, 9th Edition, 2012.										
VEHICLE TRIP ESTIMATES										
Land Use	ITE#	Quantity	Unit	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Phase 1 (2017-2021)										
Single-Family Housing	210	347	DU ¹	3,299	63	190	253	203	119	322
Apartments [b]	220	384	DU ¹	2,451	38	154	192	149	80	229
Retail [c]	820	169.597	KSF ²	9,573	133	82	215	410	444	854
Parks	412	26.660	Acres	61	1	0	1	1	1	2
Elementary School [d]	520	750	Students	968	186	152	338	55	58	113
Internal Capture or Non-motorized Trips (15% Daily; 25% AM and PM) [e]				-2,453	-105	-145	-250	-205	-175	-380
Pass-by Reduction (10% Daily and AM; 20% PM) [f]				-813	-10	-6	-16	-61	-67	-128
Total Net New External Vehicle Trips (Phase 1 Only)				13,086	306	427	733	552	460	1,012
Source: Fehr & Peers, 2014; Waikapu Country Town Conceptual Land Use Plan by Planning Consultants Hawaii, LLC. (October 2014)										
Notes:										
¹ Dwelling Unit = DU										
² 1,000 square feet = ksf										
[a] Fitted curve equations were used to derive AM peak hour, PM peak hour, and daily trip generation.										
[b] The country town mixed-use residential units and the multi-family residential units were all analyzed as apartments for conservative trip generation analysis purposes.										
[c] Does not include the 29,250 square feet of existing commercial uses located in the same area as the “village center,” which will remain.										
[d] Elementary school student body assumed based on information provided in the latest Waikapu Country Town Land Use Plan dated March 3, 2014 and further consultation with the Planning Consultants Hawaii, LLC and Hawaii Department of Education, Facilities.										
[e] Under Phase 1 conditions, it is assumed that the percentage reductions related to internal capture and non-motorized trips are different than full project buildout reductions because a smaller portion of the makai and the mauka side of the WCT project will be developed and less residential units will be constructed. An estimated 15% reduction of daily trips and 25% AM and PM peak hour trips were made to account for the mixed-use nature of the site, where vehicle trips can be linked and/or replaced with non-motorized trips. The MXD process was used to confirm and refine the initial reduction estimate. The MXD+ estimates peak hour internalization at 26% to 35% for WCT Phase 1.										
[f] Based on the ITE Trip Generation Handbook, 2nd Edition, 2004, the estimated pass-by trip credit (assuming all WCT commercial space is for retail) is about 33%. However, because some space is expected to be service-oriented or small office, and to provide a more conservative analysis it is estimated that the pass-by credit is 10% and 20% of the net daily and net AM and PM peak hour retail trips, respectively.										

APPENDIX F: PROPOSED MITIGATION MEASURES

Proposed Year 2022 Mitigation Measures

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
1

N-S : Honoapi'ilani Highway
E-W : Kuikahi Drive

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
	NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Prot; SB: Prot; EB: Perm; WB: Perm			NB: Prot; SB: Prot; EB: Perm; WB: Perm	

Intersection #
2

N-S : Waiale Road
E-W : Kuikahi Drive

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
	NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot	

Intersection #
3

N-S : S. Kamehameha Avenue
E-W : Maui Lani Parkway

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
	NB: Stop; SB: Stop; EB: Stop; WB: Stop			NB: Stop; SB: Stop; EB: Stop; WB: Stop			NB: Stop; SB: Stop; EB: Stop; WB: Stop			NB: Perm; SB: Perm; EB: Perm; WB: Perm			NB: Perm; SB: Perm; EB: Perm; WB: Perm	

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
4
N-S : Kuihelani Highway E-W : Maui Lani Parkway

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
NB: Prot; SB: Prot; EB: Perm			NB: Prot; SB: Prot; EB: Perm			NB: Prot; SB: Prot; EB: Perm			NB: Prot; SB: Prot; EB: Split			NB: Prot; SB: Prot; EB: Split		

Intersection #
5
N-S : Honoapi'ilani Highway E-W : Waiko Road

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			No Impact			No Impact		

Intersection #
6
N-S : Waiale Road E-W : Waiko Road

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
SB: Stop; EB: Free; WB: Free			NB: Perm; SB: Perm; EB: Perm; WB: Perm			NB: Perm; SB: Perm; EB: Perm; WB: Perm			No Impact			No Impact		

- Legend:**
- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
 - WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.
- : Indicates changes between the "pre-mitigation" scenarios
- : Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
7
N-S : S. Kamehameha Avenue
E-W : Waiko Road

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
														
Intersection Does Not Exist				NB: Stop; SB: Stop; EB: Free; WB: Free			NB: Stop; SB: Stop; EB: Free; WB: Free			NB: Perm; SB: Perm; EB: Perm; WB: Perm			NB: Perm; SB: Perm; EB: Perm; WB: Perm	
														

Intersection #
8
N-S : Kuihelani Highway
E-W : Waiko Road

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
														
	NB: Prot; SB: Perm; EB: Perm			NB: Prot; SB: Perm; EB: Perm			NB: Prot; SB: Perm; EB: Perm		No Impact			No Impact		
														

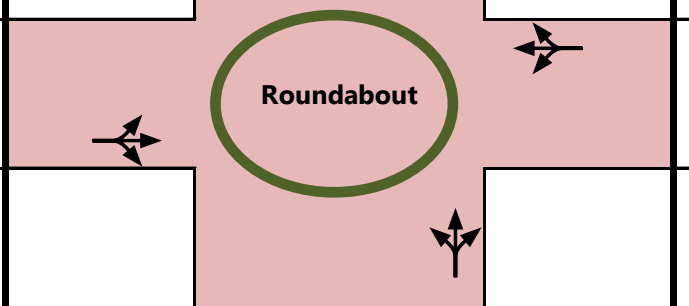
Intersection #
9
N-S : Honoapi'ilani Highway
E-W : Main Street

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
														
Intersection Does Not Exist			Intersection Does Not Exist				NB: Perm; SB: Perm; EB: Perm; WB: Perm		No Impact			No Impact		
														

- Legend:**
- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
 - WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.
- : Indicates changes between the "pre-mitigation" scenarios
- : Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
10
N-S : Waiale Road
E-W : Main Street

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
														
Intersection Does Not Exist			Intersection Does Not Exist						Roundabout			Roundabout		
														

Intersection #
11
N-S : Honoapi'ilani Highway
E-W : East-West Residential Street

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
Intersection Does Not Exist			Intersection Does Not Exist			Intersection Does Not Exist			Intersection Does Not Exist			Intersection Does Not Exist		

Intersection #
12
N-S : North-South Residential Street
E-W : Waiale Road

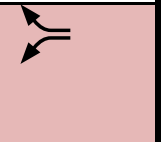
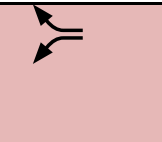
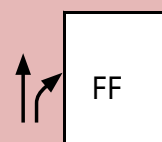
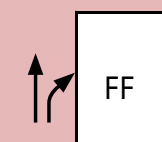
Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
Intersection Does Not Exist			Intersection Does Not Exist			Intersection Does Not Exist			Intersection Does Not Exist			Intersection Does Not Exist		

- Legend:**
- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
 - WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.
-  : Indicates changes between the "pre-mitigation" scenarios
-  : Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2022 Mitigation Measures for the Waikapu Country Town (WCT) Project

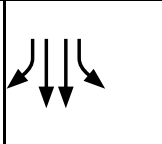
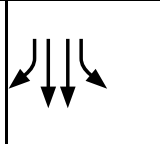
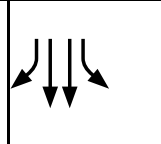
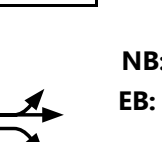
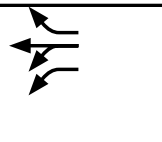
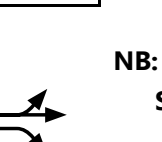
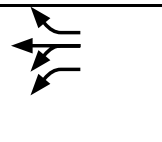
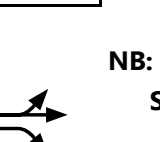
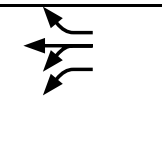
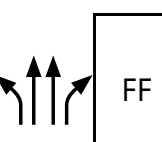
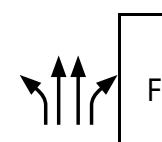
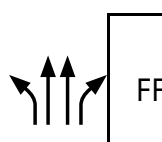
Intersection #
13

N-S : Honoapi'ilani Highway
E-W : Waiale Road

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
														
Intersection Does Not Exist				NB: Perm; SB: Perm; WB: Perm			NB: Perm; SB: Perm; WB: Perm		No Impact			No Impact		
					FF			FF						

Intersection #
14

N-S : Honoapi'ilani Highway
E-W : Kuihelani Highway

Existing_2013			Mid-Term No Project_2022			Mid-Term WCT_2022			Mid-Term WCT Pre-Proj MIT_2022			Mid-Term WCT MIT_2022		
		FF			FF			FF						
	NB: Prot; SB: Prot; EB: Split; WB: Split			NB: Prot; SB: Prot; EB: Split; WB: Split			NB: Prot; SB: Prot; EB: Split; WB: Split		No Impact			No Impact		
		FF			FF			FF						

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
1

N-S : Honoapi'ilani Highway
E-W : Kuikahi Drive

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
	NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Prot; SB: Prot; EB: Perm; WB: Perm			NB: Prot; SB: Prot; EB: Perm; WB: Perm	

Intersection #
2

N-S : Waiale Road
E-W : Kuikahi Drive

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
	NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot			NB: Pm+Prot; SB: Pm+Prot; EB: Pm+Prot; WB: Pm+Prot	

Intersection #
3

N-S : S. Kamehameha Avenue
E-W : Maui Lani Parkway

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
	NB: Stop; SB: Stop; EB: Stop; WB: Stop			NB: Stop; SB: Stop; EB: Stop; WB: Stop			NB: Stop; SB: Stop; EB: Stop; WB: Stop			NB: Perm; SB: Perm; EB: Perm; WB: Perm			NB: Perm; SB: Perm; EB: Perm; WB: Perm	

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
4
N-S : Kuihelani Highway E-W : Maui Lani Parkway

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
NB: Prot; SB: Prot; EB: Perm			NB: Prot; SB: Prot; EB: Perm			NB: Prot; SB: Prot; EB: Perm			NB: Prot; SB: Prot; EB: Split			NB: Prot; SB: Prot; EB: Split		

Intersection #
5
N-S : Honoapi'ilani Highway E-W : Waiko Road

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			NB: Pm+Prot; SB: Pm+Prot; EB: Perm; WB: Perm			No Impact			No Impact		

Intersection #
6
N-S : Waiale Road E-W : Waiko Road

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
SB: Stop; EB: Free; WB: Free			NB: Perm; SB: Perm; EB: Perm; WB: Perm			NB: Perm; SB: Perm; EB: Perm; WB: Perm			No Impact			No Impact		

- Legend:**
- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
 - WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.
- : Indicates changes between the "pre-mitigation" scenarios
- : Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
7
N-S : S. Kamehameha Avenue
E-W : Waiko Road

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
														
Intersection Does Not Exist				NB: Stop; SB: Stop; EB: Free; WB: Free			NB: Stop; SB: Stop; EB: Free; WB: Free			NB: Perm; SB: Perm; EB: Perm; WB: Perm			NB: Perm; SB: Perm; EB: Perm; WB: Perm	
														

Intersection #
8
N-S : Kuihelani Highway
E-W : Waiko Road

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
														
	NB: Prot; SB: Perm; EB: Perm			NB: Prot; SB: Perm; EB: Perm			NB: Prot; SB: Perm; EB: Perm			NB: Prot; SB: Perm; EB: Perm			NB: Prot; SB: Perm; EB: Perm	
														

Intersection #
9
N-S : Honoapi'ilani Highway
E-W : Main Street

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
														
Intersection Does Not Exist			Intersection Does Not Exist				NB: Perm; SB: Perm; EB: Perm; WB: Perm		No Impact			No Impact		
														

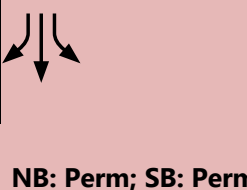
- Legend:**
- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
 - WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.
- : Indicates changes between the "pre-mitigation" scenarios
- : Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

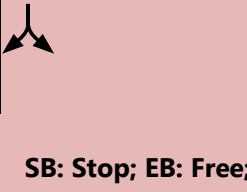
Intersection #
10
N-S : Waiale Road
E-W : Main Street

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
														
Intersection Does Not Exist			Intersection Does Not Exist			Roundabout			Roundabout			Roundabout		
														

Intersection #
11
N-S : Honoapi'ilani Highway
E-W : East-West Residential Street

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
														
Intersection Does Not Exist			Intersection Does Not Exist			NB: Perm; SB: Perm; EB: Perm; WB: Perm			No Impact			No Impact		

Intersection #
12
N-S : North-South Residential Street
E-W : Waiale Road

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
														
Intersection Does Not Exist			Intersection Does Not Exist			SB: Stop; EB: Free; WB: Free			No Impact			No Impact		

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate indentified impacts

Proposed Year 2026 Mitigation Measures for the Waikapu Country Town (WCT) Project

Intersection #
13
N-S : Honoapi'ilani Highway
E-W : Waiale Road

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
Intersection Does Not Exist				NB: Perm; SB: Perm; WB: Perm			NB: Perm; SB: Perm; EB: Pm+Prot; WB: Pm+Prot		No Impact			No Impact		
					FF			FF						

Intersection #
14
N-S : Honoapi'ilani Highway
E-W : Kuihelani Highway

Existing_2013			Buildout No Project_2026			Buildout WCT_2026			Buildout WCT Pre-Proj MIT_2026			Buildout WCT MIT_2026		
		FF			FF			FF						
	NB: Prot; SB: Prot; EB: Split; WB: Split			NB: Prot; SB: Prot; EB: Split; WB: Split			NB: Prot; SB: Prot; EB: Split; WB: Split		No Impact			No Impact		
		FF			FF			FF						

Legend:

- Pre-Proj MIT = Mitigation measure improves intersection conditions to pre-project conditions or better.
- WCT MIT = Mitigation measure improves intersection conditions to LOS D conditions or better.

: Indicates changes between the "pre-mitigation" scenarios

: Illustrates proposed changes to mitigate identified impacts