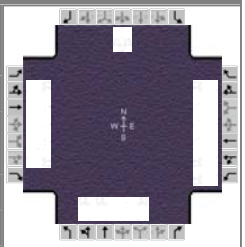
2010 HCS Signalized Intersection Results Summary

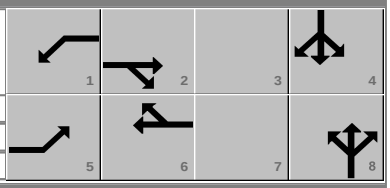
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	1 AM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	1920	120	150	1140	10	100	70	60	20	40	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	0.7	69.0	7.1	8.1	0.0
Yellow	3.5	0.0	4.8	4.0	4.0	0.0
Red	3.0	0.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	89.8	15.2	90.4	15.1	15.1	14.1	14.1
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.1	4.1	4.0	4.0
Queue Clearance Time (g_s), s	2.7		8.1		7.3	7.3	7.0	7.0
Green Extension Time (g_e), s	0.0	0.0	0.6	0.0	0.8	0.8	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.00	0.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	11	2043	128	160	1213	11	106	74	64	74	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1412	1541	1643	1533	1541	1810	1412	1740	0	0
Queue Service time (g_s), s	0.7	21.2	5.1	6.1	9.9	0.4	4.0	4.8	5.3	5.0	0.0	0.0
Cycle Queue Clearance Time (g_c), s	0.7	21.2	5.1	6.1	9.9	0.4	4.0	4.8	5.3	5.0	0.0	0.0
Capacity *(c)*, veh/h	115	3120	812	223	2860	890	207	122	95	103		
Volume-to-Capacity Ratio *(X)*	0.093	0.655	0.157	0.717	0.424	0.012	0.513	0.612	0.672	0.724	0.000	0.000
Available Capacity (c_a), veh/h	400	3120	812	972	2860	890	665	391	305	159		
Back of Queue *(Q)*, veh/ln	0.3	5.3	1.6	2.4	2.7	0.1	1.6	2.3	2.1	2.4		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	52.6	8.4	11.9	54.5	6.8	10.6	54.1	54.4	54.7	55.5		
Incremental Delay (d_2), s/veh	0.3	1.1	0.4	4.3	0.5	0.0	2.0	4.9	8.0	9.2	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	52.9	9.5	12.3	58.7	7.3	10.7	56.0	59.3	62.6	64.7		
Level of Service (LOS)	D	A	B	E	A	B	E	E	E	E		
Approach Delay, s/veh / LOS	9.9	A		13.2	B		58.8	E		64.7	E	
Intersection Delay s/veh / LOS	15.2						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	1.7	A	1.2	A	0.9	A	0.6	A

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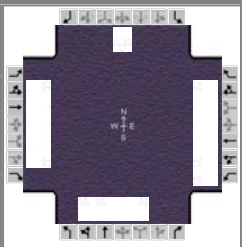
2010 HCS Signalized Intersection Results Summary

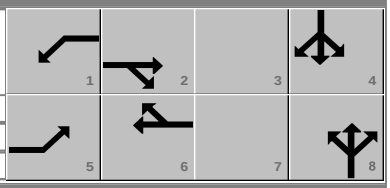
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	1 PM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	1600	610	450	1700	150	500	80	250	150	110	30

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	11.2	45.9	20.0	31.3	0.0
Yellow	3.5	3.5	4.8	4.0	4.0	0.0
Red	3.0	3.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	79.6	32.2	97.2	38.3	38.3	27.0	27.0
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.1	4.1	4.0	4.0
Queue Clearance Time (g_s), s	5.6		25.3		30.1	30.1	22.0	22.0
Green Extension Time (g_e), s	0.0	0.0	0.3	0.0	1.1	1.1	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	43	1702	649	479	1809	160	532	85	266	309	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1388	1515	1643	1533	1515	1810	1388	1732	0	0
Queue Service time (g_s), s	3.6	45.9	45.9	23.3	46.9	10.0	25.3	5.9	28.1	20.0	0.0	0.0
Cycle Queue Clearance Time (g_c), s	3.6	45.9	45.9	23.3	46.9	10.0	25.3	5.9	28.1	20.0	0.0	0.0
Capacity *(c)*, veh/h	92	1660	424	518	2087	649	632	377	289	231		
Volume-to-Capacity Ratio *(X)*	0.463	1.025	1.529	0.924	0.866	0.246	0.842	0.226	0.919	1.336	0.000	0.000
Available Capacity (c_a), veh/h	158	1660	424	540	2087	649	666	398	305	231		
Back of Queue *(Q)*, veh/ln	1.7	23.0	44.9	10.3	16.8	3.8	10.3	2.7	12.1	20.1		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	68.9	44.4	52.1	61.2	29.0	27.8	57.0	49.3	58.1	65.0		
Incremental Delay (d_2), s/veh	3.6	28.8	249.7	21.4	5.1	0.9	9.2	0.3	30.6	177.4	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	72.5	73.2	301.7	82.6	34.2	28.7	66.2	49.6	88.7	242.4		
Level of Service (LOS)	E	F	F	F	C	C	E	D	F	F		
Approach Delay, s/veh / LOS	135.1	F		43.3	D		71.4	E		242.4	F	
Intersection Delay s/veh / LOS	94.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	1.8	A	1.8	A	1.9	A	1.0	A

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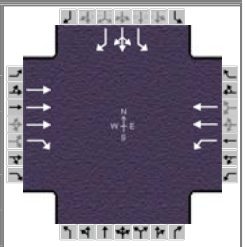
2010 HCS Signalized Intersection Results Summary

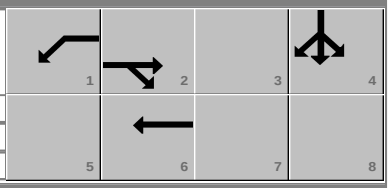
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.93
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2012	Analysis Period	1> 7:00
File Name	2 AM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1740	260	100	700					260	0	600

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	10.5	65.7	24.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	103.0	17.0	120.0	0.0		30.8	30.8
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time (g_s), s			10.3				26.5	26.5
Green Extension Time (g_e), s	0.0	0.0	0.2	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			0.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1871	280	108	753	0	0			280	0	645
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1365	1533	1723	0	0			1616	1900	1438
Queue Service time (g_s), s	0.0	24.9	14.0	8.3	3.0	0.0	0.0			20.0	0.0	24.5
Cycle Queue Clearance Time (g_c), s	0.0	24.9	14.0	8.3	3.0	0.0	0.0			20.0	0.0	24.5
Capacity *(c)*, veh/h		2700	747	134	2374					330	388	294
Volume-to-Capacity Ratio *(X)*	0.000	0.693	0.374	0.804	0.317	0.000	0.000			0.848	0.000	2.198
Available Capacity (c_a), veh/h		2700	747	294	2374					330	388	294
Back of Queue *(Q)*, veh/ln		5.9	4.3	3.5	0.8					9.4	0.0	53.3
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay (d_1), s/veh		10.7	15.4	53.8	1.6					46.0	0.0	47.8
Incremental Delay (d_2), s/veh	0.0	1.5	1.4	10.6	0.4	0.0	0.0			18.2	0.0	550.1
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		12.2	16.9	64.4	2.0					64.2	0.0	597.9
Level of Service (LOS)		B	B	E	A					E		F
Approach Delay, s/veh / LOS	12.8	B		9.8	A		0.0			436.5	F	
Intersection Delay s/veh / LOS	111.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	1.7	A	1.2	A			2.0	B

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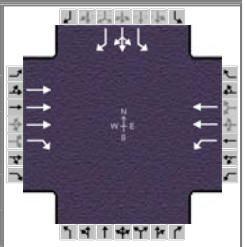
2010 HCS Signalized Intersection Results Summary

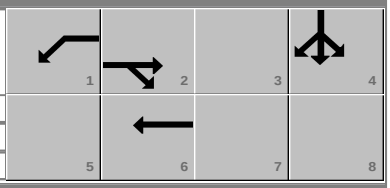
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.97
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2012	Analysis Period	1> 7:00
File Name	2 PM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1600	400	100	1250					300	0	1050

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	11.4	80.8	38.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	132.1	17.9	150.0	0.0		44.8	44.8
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time (g_s), s			11.2				40.5	40.5
Green Extension Time (g_e), s	0.0	0.0	0.2	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			0.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1649	412	103	1289	0	0			309	0	1082
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1477	1660	1723	0	0			1587	1900	1412
Queue Service time (g_s), s	0.0	25.5	26.8	9.2	13.7	0.0	0.0			27.0	0.0	38.5
Cycle Queue Clearance Time (g_c), s	0.0	25.5	26.8	9.2	13.7	0.0	0.0			27.0	0.0	38.5
Capacity *(c)*, veh/h		2657	796	126	2267					407	488	363
Volume-to-Capacity Ratio *(X)*	0.000	0.621	0.518	0.820	0.568	0.000	0.000			0.759	0.000	2.986
Available Capacity (c_a), veh/h		2657	796	243	2267					407	488	363
Back of Queue *(Q)*, veh/ln		7.2	9.5	4.3	3.2					11.4	0.0	104.1
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay (d_1), s/veh		13.3	22.1	68.3	4.0					51.5	0.0	55.8
Incremental Delay (d_2), s/veh	0.0	1.1	2.4	12.2	1.0	0.0	0.0			8.1	0.0	901.1
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		14.4	24.5	80.6	5.0					59.5	0.0	956.8
Level of Service (LOS)		B	C	F	A					E		F
Approach Delay, s/veh / LOS	16.4	B		10.6	B		0.0			757.4	F	
Intersection Delay s/veh / LOS	227.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	1.6	A	1.6	A			2.8	C

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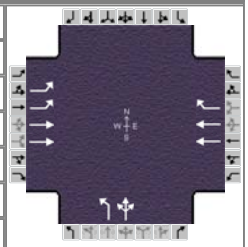
2010 HCS Signalized Intersection Results Summary

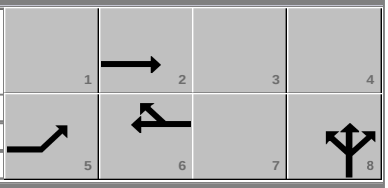
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2012 Build	Analysis Period	1> 7:00
File Name	3 AM KY 18 & I 75 NB Ramps.xus				
Project Description	Mall Road Interchange				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1200	800			400	200	400	0	200			

Signal Information			
Cycle, s	119.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	42.0	22.1	35.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	48.5	77.0	0.0	28.5	42.8	42.8	0.0	
Change Period, $(Y+R_c)$, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	6.0	0.0	6.1	6.2	6.2	0.0	
Queue Clearance Time (g_s), s	44.0	17.7		17.9	37.4	37.4		
Green Extension Time (g_e), s	0.0	8.1	0.0	4.3	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	0.13		0.33	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1250	833	0	0	417	208	417	0	208	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time (g_s), s	42.0	15.7	0.0	0.0	13.4	15.9	30.4	35.4	12.5	0.0		
Cycle Queue Clearance Time (g_c), s	42.0	15.7	0.0	0.0	13.4	15.9	30.4	35.4	12.5	0.0		
Capacity *(c)*, veh/h	1140	2031			636	275	465	0	476			
Volume-to-Capacity Ratio *(X)*	1.096	0.410	0.000	0.000	0.655	0.757	0.896	0.000	0.438	0.000		
Available Capacity (c_a), veh/h	1140	2031			891	386	465	0				
Back of Queue *(Q)*, veh/ln	25.3	6.0			5.9	6.5	14.2		5.0			
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay (d_1), s/veh	38.9	13.3			45.3	46.3	40.5		34.2			
Incremental Delay (d_2), s/veh	56.9	0.6	0.0	0.0	2.4	9.5	20.6	0.0	1.4	0.0		
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	95.8	13.9			47.8	55.8	61.1		35.5			
Level of Service (LOS)	F	B			D	E	E		D			
Approach Delay, s/veh / LOS	63.1	E		50.4	D		52.6	D		0.0		
Intersection Delay s/veh / LOS	58.7						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.2	B	1.0	A	1.5	A		

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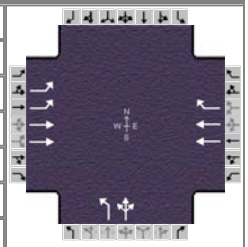
2010 HCS Signalized Intersection Results Summary

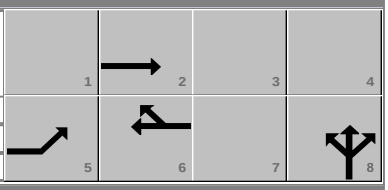
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2012 Build	Analysis Period	1> 7:00
File Name	3 PM KY 18 & I 75 NB Ramps.xus				
Project Description	Mall Road Interchange				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	900	1000			900	300	450	0	100			

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	31.5	50.8	47.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	38.0	95.2	0.0	57.2	54.8	54.8	0.0	
Change Period, *(Y+R$_c$)*, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	6.0	0.0	6.1	6.2	6.2	0.0	
Queue Clearance Time *(g$_s$)*, s	33.5	28.5		39.1	49.4	49.4		
Green Extension Time *(g$_e$)*, s	0.0	2.1	0.0	11.7	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	1.00		0.43	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	938	1042	0	0	938	313	469	0	104	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time *(g$_s$)*, s	31.5	26.5	0.0	0.0	37.1	26.3	43.5	47.4	7.1	0.0		
Cycle Queue Clearance Time *(g$_c$)*, s	31.5	26.5	0.0	0.0	37.1	26.3	43.5	47.4	7.1	0.0		
Capacity *(c)*, veh/h	683	2040			1167	505	497	0	509			
Volume-to-Capacity Ratio *(X)*	1.372	0.511	0.000	0.000	0.803	0.619	0.943	0.000	0.205	0.000		
Available Capacity *(c$_a$)*, veh/h	683	2040			1401	606	497	0				
Back of Queue *(Q)*, veh/ln	29.7	10.6			16.4	10.0	20.7		2.9			
Overflow Queue *(Q$_3$)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay *(d$_1$)*, s/veh	59.3	17.9			45.1	41.5	50.0		37.5			
Incremental Delay *(d$_2$)*, s/veh	176.6	0.9	0.0	0.0	3.9	2.7	27.2	0.0	0.4	0.0		
Initial Queue Delay *(d$_3$)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	235.9	18.8			49.0	44.2	77.2		37.9			
Level of Service (LOS)	F	B			D	D	E		D			
Approach Delay, s/veh / LOS	121.6	F		47.8	D		70.1	E		0.0		
Intersection Delay s/veh / LOS	89.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.1	B	1.5	A	1.4	A		

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: AM Peak Hour Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2012
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1200			500	
Peak-Hour Factor, PHF		0.85			0.92	
Hourly Flow Rate, HFR		1411			543	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	150		300			
Peak Hour Factor, PHF	0.76		0.96			
Hourly Flow Rate, HFR	197		312			
Percent Heavy Vehicles	7		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			197		312			
C(m) (vph)			154		421			
v/c			1.28		0.74			
95% queue length			11.69		5.97			
Control Delay			223.1		34.3			
LOS			F		D			
Approach Delay				107.4				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: PM Peak Hour Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2012
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		950			1120	
Peak-Hour Factor, PHF		0.94			0.83	
Hourly Flow Rate, HFR		1010			1349	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

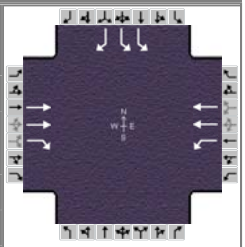
Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	180		220			
Peak Hour Factor, PHF	0.83		0.89			
Hourly Flow Rate, HFR	216		247			
Percent Heavy Vehicles	5		5			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			216		247			
C(m) (vph)			203		557			
v/c			1.06		0.44			
95% queue length			9.85		2.26			
Control Delay			130.4		16.5			
LOS			F		C			
Approach Delay				69.6				
Approach LOS				F				

2010 HCS Signalized Intersection Results Summary

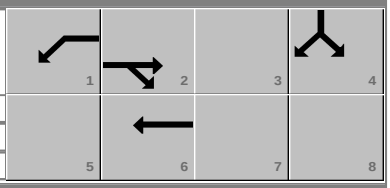
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.90
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2012	Analysis Period	1> 7:00
File Name	5 AM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1400	100	150	500					650		300

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	17.9	82.4	42.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	135.6	24.4	160.0	0.0		47.5	47.5
Change Period, *(Y+Rc)*, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.6	4.6
Queue Clearance Time *(g_s)*, s			17.9				44.0	44.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.1	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1556	111	167	556	0	0			722	0	333
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1477	1660	1630	0	0			1597	0	1464
Queue Service time *(g_s)*, s	0.0	65.9	6.3	15.9	3.9	0.0	0.0			34.5	42.0	34.8
Cycle Queue Clearance Time *(g_c)*, s	0.0	65.9	6.3	15.9	3.9	0.0	0.0			34.5	42.0	34.8
Capacity *(c)*, veh/h		1677	760	186	2175					839	0	384
Volume-to-Capacity Ratio *(X)*	0.000	0.927	0.146	0.895	0.255	0.000	0.000			0.861	0.000	0.868
Available Capacity *(c_a)*, veh/h		1677	760	202	2175					839	0	384
Back of Queue *(Q)*, veh/ln		22.7	2.3	8.5	1.2					14.8		14.7
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		22.5	20.4	70.1	3.1					56.2	0.0	56.3
Incremental Delay *(d_2)*, s/veh	0.0	10.4	0.4	35.0	0.3	0.0	0.0			9.2	0.0	18.8
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		32.9	20.8	105.1	3.4					65.4	0.0	75.1
Level of Service (LOS)		C	C	F	A					E		E
Approach Delay, s/veh / LOS	32.1	C		26.9	C		0.0			68.5	E	
Intersection Delay s/veh / LOS	42.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	1.9	A	1.1	A				F

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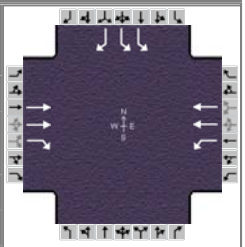
2010 HCS Signalized Intersection Results Summary

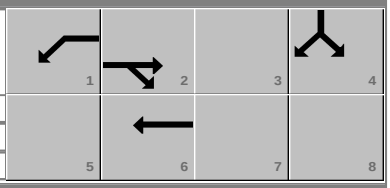
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.97
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2012	Analysis Period	1> 7:00
File Name	5 PM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1100	300	350	950					400		750

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	14.5	82.8	45.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	139.0	21.0	160.0	0.0		50.5	50.5
Change Period, *(Y+Rc)*, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.7	4.7
Queue Clearance Time *(g_s)*, s			16.5				47.0	47.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1134	309	361	979	0	0			412	0	773
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1563	1757	1630	0	0			1689	0	1548
Queue Service time *(g_s)*, s	0.0	32.2	19.0	14.5	10.8	0.0	0.0			16.0	45.0	45.0
Cycle Queue Clearance Time *(g_c)*, s	0.0	32.2	19.0	14.5	10.8	0.0	0.0			16.0	45.0	45.0
Capacity *(c)*, veh/h		1687	809	159	2114					950	0	435
Volume-to-Capacity Ratio *(X)*	0.000	0.672	0.382	2.266	0.463	0.000	0.000			0.434	0.000	1.776
Available Capacity *(c_a)*, veh/h		1687	809	159	2114					950	0	435
Back of Queue *(Q)*, veh/ln		10.4	7.3	32.6	2.8					6.8		60.7
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		17.0	23.2	72.8	4.5					47.1	0.0	57.5
Incremental Delay *(d_2)*, s/veh	0.0	2.2	1.4	589.4	0.7	0.0	0.0			0.4	0.0	358.3
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		19.1	24.6	662.2	5.3					47.5	0.0	415.8
Level of Service (LOS)		B	C	F	A					D		F
Approach Delay, s/veh / LOS	20.3	C		182.1	F		0.0			287.7	F	
Intersection Delay s/veh / LOS	154.8						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	1.7	A	1.6	A				F

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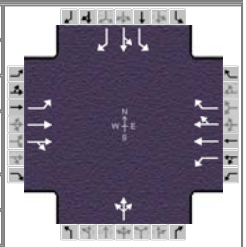
2010 HCS Signalized Intersection Results Summary

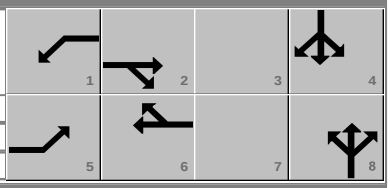
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.84
Intersection	US 42 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	6 AM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	280	1320	10	10	590	200	20	20	30	150	10	110

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	5.0	25.0	67.3	20.8	9.8	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	43.0	132.2	11.5	100.8	16.3	16.3	27.3	27.3
Change Period, $(Y+R_c)$, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time (g_s), s	34.8		3.0		9.6	9.6	19.7	19.7
Green Extension Time (g_e), s	1.6	0.0	0.0	0.0	0.2	0.2	1.1	1.1
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.00	0.00	0.04	0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	333	792	791	12	702	238	83	0	0	179	12	131
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1587	1712	1707	1810	1712	1412	1741	0	0	1587	1900	1412
Queue Service time (g_s), s	32.8	34.2	34.7	1.0	19.8	18.8	7.6	0.0	0.0	17.7	0.9	14.2
Cycle Queue Clearance Time (g_c), s	32.8	34.2	34.7	1.0	19.8	18.8	7.6	0.0	0.0	17.7	0.9	14.2
Capacity *(c)*, veh/h	362	1057	1054	57	1440	594	106			206	246	183
Volume-to-Capacity Ratio *(X)*	0.922	0.750	0.751	0.211	0.488	0.401	0.783	0.000	0.000	0.867	0.048	0.715
Available Capacity (c_a), veh/h	778	1057	1054	299	1440	594	280			313	374	278
Back of Queue *(Q)*, veh/ln	14.2	8.5	8.8	0.5	7.5	6.8	3.8			8.0	0.4	5.4
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	60.4	8.5	8.6	75.6	24.7	32.3	74.1			68.3	61.0	66.8
Incremental Delay (d_2), s/veh	11.5	4.9	4.9	2.2	1.2	2.0	13.9	0.0	0.0	16.4	0.1	6.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	71.9	13.3	13.6	77.8	25.9	34.3	88.0			84.7	61.1	72.9
Level of Service (LOS)	E	B	B	E	C	C	F			F	E	E
Approach Delay, s/veh / LOS	23.6	C		28.6	C		88.0	F		79.0	E	
Intersection Delay s/veh / LOS	32.2						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	2.1	B	1.3	A	0.6	A	1.0	A

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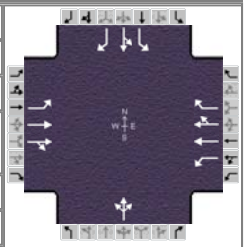
2010 HCS Signalized Intersection Results Summary

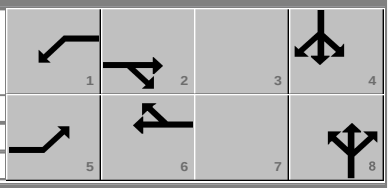
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.98
Intersection	US 42 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	6 PM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	340	940	20	20	1330	350	20	40	20	440	30	650

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	5.0	24.7	57.3	31.5	9.3	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	42.7	132.7	11.5	101.5	15.8	15.8	38.0	38.0
Change Period, ($Y+R_c$), s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway (*MAH*), s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time (g_s), s	37.4		3.8		9.2	9.2	33.5	33.5
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.00		0.32	0.32	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	347	492	488	20	1357	357	82	0	0	449	31	663
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1560	1712	1699	1810	1712	1388	1797	0	0	1560	1900	1388
Queue Service time (g_s), s	35.4	19.5	20.0	1.8	57.3	35.6	7.2	0.0	0.0	31.5	2.1	31.5
Cycle Queue Clearance Time (g_c), s	35.4	19.5	20.0	1.8	57.3	35.6	7.2	0.0	0.0	31.5	2.1	31.5
Capacity (*c*), veh/h	353	947	940	57	1226	497	104			307	374	273
Volume-to-Capacity Ratio (*X*)	0.982	0.519	0.519	0.361	1.107	0.718	0.784	0.000	0.000	1.462	0.082	2.427
Available Capacity (c_a), veh/h	353	947	940	353	1226	497	168			307	374	273
Back of Queue (*Q*), veh/ln	18.1	6.3	6.5	0.9	32.3	13.3	3.7			31.6	1.0	60.6
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (*RQ*)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	61.6	11.9	12.3	75.9	41.8	44.4	74.4			64.3	52.4	64.3
Incremental Delay (d_2), s/veh	43.1	2.0	2.0	4.6	60.2	8.6	14.2	0.0	0.0	225.0	0.1	653.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	104.6	14.0	14.4	80.5	102.0	53.0	88.6			289.3	52.6	717.4
Level of Service (LOS)	F	B	B	F	F	D	F			F	D	F
Approach Delay, s/veh / LOS	37.8	D		91.7	F		88.6	F		531.4	F	
Intersection Delay s/veh / LOS	192.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.5	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.6	A	1.9	A	0.6	A	2.4	B

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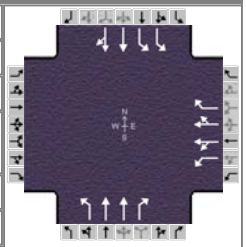
2010 HCS Signalized Intersection Results Summary

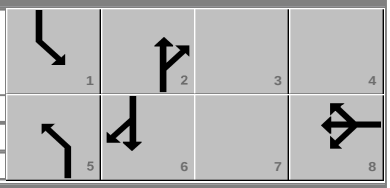
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.84
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2012	Analysis Period	1> 7:00
File Name	7 AM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				90	60	100	10	250	350	150	150	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	3.0	77.2	15.2	0.0	0.0
Yellow	3.5	0.0	4.4	4.0	0.0	0.0
Red	3.0	0.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		21.1	21.1	12.5	104.5	15.5	107.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.2	6.2	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			12.8	12.8	2.9		8.3	
Green Extension Time (g_e), s	0.0		2.5	2.5	0.0	0.0	0.7	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			0.00	0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			107	71	119	12	298	417	179	96	95
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1436	1508	1278	1587	1587	1533	1673	1667	1630
Queue Service time (g_s), s	0.0			8.4	2.5	10.8	0.9	1.8	16.0	6.3	0.8	1.0
Cycle Queue Clearance Time (g_c), s	0.0			8.4	2.5	10.8	0.9	1.8	16.0	6.3	0.8	1.0
Capacity *(c)*, veh/h				182	383	162	79	2041	986	250	1113	1089
Volume-to-Capacity Ratio *(X)*	0.000			0.587	0.186	0.733	0.150	0.146	0.422	0.714	0.086	0.087
Available Capacity (c_a), veh/h				479	1005	426	778	2041	986	1056	1113	1089
Back of Queue *(Q)*, veh/ln				3.3	1.0	4.0	0.4	0.6	5.4	2.7	0.3	0.4
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				49.4	46.8	50.4	54.6	3.2	10.5	54.3	2.2	2.8
Incremental Delay (d_2), s/veh	0.0			6.3	0.5	12.7	0.9	0.2	1.3	3.8	0.2	0.2
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				55.7	47.3	63.2	55.4	3.3	11.8	58.0	2.4	3.0
Level of Service (LOS)				E	D	E	E	A	B	E	A	A
Approach Delay, s/veh / LOS	0.0			56.7	E		9.0	A		29.5	C	
Intersection Delay s/veh / LOS	24.6						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			0.7	A	1.1	A	0.8	A

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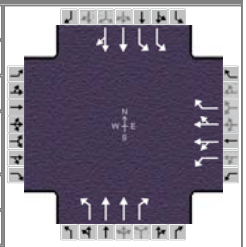
2010 HCS Signalized Intersection Results Summary

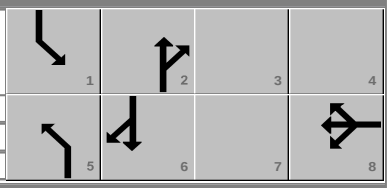
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.97
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2012	Analysis Period	1> 7:00
File Name	7 PM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				330	150	600	50	620	130	240	620	20

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	6.1	83.3	35.0	0.0	0.0
Yellow	3.5	0.0	4.4	4.0	0.0	0.0
Red	3.0	0.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		40.9	40.9	13.5	130.4	19.6	136.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.3	6.3	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			37.0	37.0	6.9		12.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.1	0.0	0.5	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			1.00	1.00	0.00		0.20	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			340	155	619	52	639	134	247	332	328
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1331	1397	1184	1560	1559	1579	1723	1638	1620
Queue Service time (g_s), s	0.0			35.0	6.7	35.0	4.9	11.0	6.2	10.6	8.5	9.0
Cycle Queue Clearance Time (g_c), s	0.0			35.0	6.7	35.0	4.9	11.0	6.2	10.6	8.5	9.0
Capacity *(c)*, veh/h				310	652	276	73	1732	877	301	976	965
Volume-to-Capacity Ratio *(X)*	0.000			1.096	0.237	2.239	0.706	0.369	0.153	0.822	0.340	0.340
Available Capacity (c_a), veh/h				310	652	276	407	1732	877	439	976	965
Back of Queue *(Q)*, veh/ln				18.5	2.4	54.1	2.2	3.4	2.3	5.0	2.8	3.0
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				57.5	46.7	57.5	70.5	10.1	16.2	67.3	7.1	7.6
Incremental Delay (d_2), s/veh	0.0			79.2	0.4	569.1	11.7	0.6	0.4	8.0	0.9	1.0
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				136.7	47.1	626.6	82.2	10.7	16.6	75.3	8.1	8.6
Level of Service (LOS)				F	D	F	F	B	B	E	A	A
Approach Delay, s/veh / LOS	0.0			396.4		F	16.1		B	26.6		C
Intersection Delay s/veh / LOS	168.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			1.4	A	1.2	A	1.2	A

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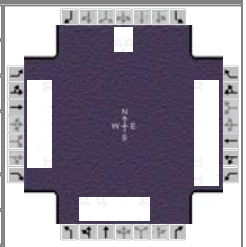
2010 HCS Signalized Intersection Results Summary

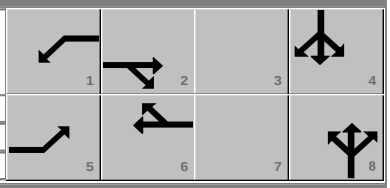
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	1 AM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	1880	130	150	1190	10	80	70	50	20	60	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	0.7	68.2	8.5	7.5	0.0
Yellow	3.5	0.0	4.8	4.0	4.0	0.0
Red	3.0	0.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	90.4	15.2	91.0	14.5	14.5	15.5	15.5
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.0	4.0	4.0	4.0
Queue Clearance Time (g_s), s	2.7		8.1		6.8	6.8	8.4	8.4
Green Extension Time (g_e), s	0.0	0.0	0.6	0.0	0.6	0.6	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.00	0.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	11	2000	138	160	1266	11	85	74	53	96	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1412	1541	1643	1533	1541	1810	1412	1755	0	0
Queue Service time (g_s), s	0.7	21.1	5.6	6.1	11.0	0.4	3.2	4.8	4.4	6.4	0.0	0.0
Cycle Queue Clearance Time (g_c), s	0.7	21.1	5.6	6.1	11.0	0.4	3.2	4.8	4.4	6.4	0.0	0.0
Capacity *(c)*, veh/h	115	3085	803	223	2828	880	192	113	88	124		
Volume-to-Capacity Ratio *(X)*	0.093	0.648	0.172	0.717	0.448	0.012	0.444	0.661	0.605	0.772	0.000	0.000
Available Capacity (c_a), veh/h	388	3085	803	952	2828	880	630	370	289	161		
Back of Queue *(Q)*, veh/ln	0.3	5.4	1.8	2.4	3.0	0.1	1.3	2.4	1.7	3.3		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	52.6	8.8	12.4	54.5	7.3	11.0	54.3	55.0	54.8	54.8		
Incremental Delay (d_2), s/veh	0.3	1.1	0.5	4.3	0.5	0.0	1.6	6.5	6.5	15.6	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	52.9	9.9	12.9	58.8	7.8	11.0	55.9	61.5	61.4	70.4		
Level of Service (LOS)	D	A	B	E	A	B	E	E	E	E		
Approach Delay, s/veh / LOS	10.3	B		13.5	B		59.2	E		70.4	E	
Intersection Delay s/veh / LOS	15.6						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	1.7	A	1.3	A	0.8	A	0.6	A

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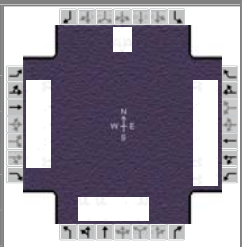
2010 HCS Signalized Intersection Results Summary

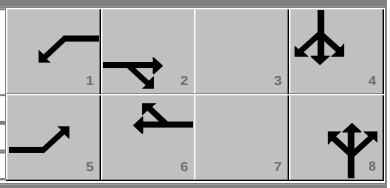
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	1 PM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	1900	600	550	1850	200	500	100	300	100	100	30

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	10.5	44.8	20.0	33.0	0.0
Yellow	3.5	3.5	4.8	4.0	4.0	0.0
Red	3.0	3.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	78.5	31.5	95.5	40.0	40.0	27.0	27.0
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.1	4.1	4.0	4.0
Queue Clearance Time (g_s), s	6.5		27.0		35.0	35.0	22.0	22.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.16		1.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	53	2021	638	585	1968	213	532	106	319	245	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1388	1515	1643	1533	1515	1810	1388	1731	0	0
Queue Service time (g_s), s	4.5	44.8	44.8	25.0	57.7	14.2	24.9	7.3	33.0	20.0	0.0	0.0
Cycle Queue Clearance Time (g_c), s	4.5	44.8	44.8	25.0	57.7	14.2	24.9	7.3	33.0	20.0	0.0	0.0
Capacity *(c)*, veh/h	92	1621	415	505	2031	632	666	398	305	231		
Volume-to-Capacity Ratio *(X)*	0.579	1.247	1.540	1.159	0.969	0.337	0.798	0.267	1.045	1.060	0.000	0.000
Available Capacity (c_a), veh/h	138	1621	415	505	2031	632	666	398	305	231		
Back of Queue *(Q)*, veh/ln	2.1	35.7	44.5	15.9	22.3	5.4	10.0	3.3	16.7	13.5		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	69.4	45.1	52.6	62.5	32.9	30.1	55.3	48.5	58.5	65.0		
Incremental Delay (d_2), s/veh	5.6	116.4	254.7	91.7	13.9	1.4	6.8	0.4	63.8	76.0	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	75.0	161.5	307.3	154.2	46.8	31.5	62.1	48.8	122.3	141.0		
Level of Service (LOS)	E	F	F	F	D	C	E	D	F	F		
Approach Delay, s/veh / LOS	194.1	F		68.3	E		80.7	F		141.0	F	
Intersection Delay s/veh / LOS	123.8						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	2.0	A	2.0	B	2.1	B	0.9	A

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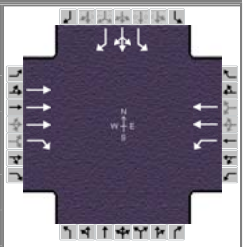
2010 HCS Signalized Intersection Results Summary

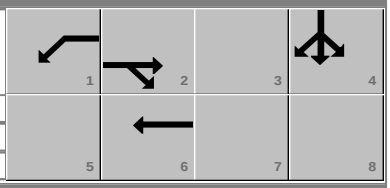
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.93
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2012	Analysis Period	1> 7:00
File Name	2 AM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1730	220	90	720					260	0	630

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	9.6	66.6	24.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	103.9	16.1	120.0	0.0		30.8	30.8
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time (g_s), s			9.4				26.5	26.5
Green Extension Time (g_e), s	0.0	0.0	0.2	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			0.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1860	237	97	774	0	0			280	0	677
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1365	1533	1723	0	0			1616	1900	1438
Queue Service time (g_s), s	0.0	23.7	11.2	7.4	3.1	0.0	0.0			20.0	0.0	24.5
Cycle Queue Clearance Time (g_c), s	0.0	23.7	11.2	7.4	3.1	0.0	0.0			20.0	0.0	24.5
Capacity *(c)*, veh/h		2735	757	123	2374					330	388	294
Volume-to-Capacity Ratio *(X)*	0.000	0.680	0.312	0.787	0.326	0.000	0.000			0.848	0.000	2.308
Available Capacity (c_a), veh/h		2735	757	294	2374					330	388	294
Back of Queue *(Q)*, veh/ln		5.6	3.5	3.2	0.9					9.4	0.0	57.3
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay (d_1), s/veh		10.0	14.4	54.2	1.6					46.0	0.0	47.8
Incremental Delay (d_2), s/veh	0.0	1.4	1.1	10.5	0.4	0.0	0.0			18.2	0.0	599.2
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		11.4	15.5	64.7	2.0					64.2	0.0	646.9
Level of Service (LOS)		B	B	E	A					E		F
Approach Delay, s/veh / LOS	11.9	B		9.0	A		0.0			476.7	F	
Intersection Delay s/veh / LOS	124.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	1.6	A	1.2	A			2.1	B

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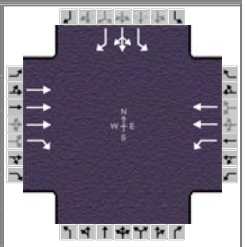
2010 HCS Signalized Intersection Results Summary

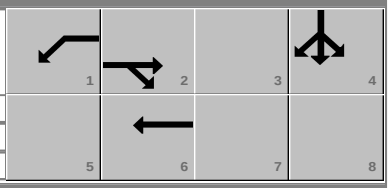
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.97
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2012	Analysis Period	1> 7:00
File Name	2 PM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1900	400	300	1600					500	0	1000

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	22.0	70.2	38.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	121.5	28.5	150.0	0.0		44.8	44.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time *(g_s)*, s			24.0				40.5	40.5
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1959	412	309	1649	0	0			515	0	1031
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1477	1660	1723	0	0			1587	1900	1412
Queue Service time *(g_s)*, s	0.0	47.7	30.9	22.0	24.4	0.0	0.0			38.5	0.0	38.5
Cycle Queue Clearance Time *(g_c)*, s	0.0	47.7	30.9	22.0	24.4	0.0	0.0			38.5	0.0	38.5
Capacity *(c)*, veh/h		2307	691	243	2267					407	488	363
Volume-to-Capacity Ratio *(X)*	0.000	0.849	0.596	1.270	0.728	0.000	0.000			1.265	0.000	2.844
Available Capacity *(c_a)*, veh/h		2307	691	243	2267					407	488	363
Back of Queue *(Q)*, veh/ln		16.0	11.4	19.3	4.5					30.6	0.0	97.7
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		24.0	29.4	64.0	4.6					55.8	0.0	55.8
Incremental Delay *(d_2)*, s/veh	0.0	4.1	3.8	149.8	2.1	0.0	0.0			137.6	0.0	837.3
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		28.1	33.2	213.8	6.7					193.4	0.0	893.0
Level of Service (LOS)		C	C	F	A					F		F
Approach Delay, s/veh / LOS	29.0	C		39.4	D		0.0			659.8	F	
Intersection Delay s/veh / LOS	198.5						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	1.8	A	2.1	B			3.0	C

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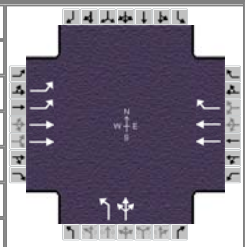
2010 HCS Signalized Intersection Results Summary

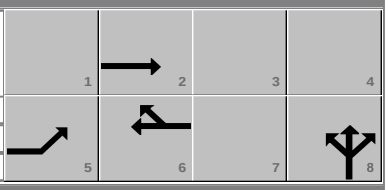
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2012 No Build	Analysis Period	1> 7:00
File Name	3 AM KY 18 & I 75 NB Ramps.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1230	760			380	170	430	0	40			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	44.5	19.8	35.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	51.0	77.1	0.0	26.2	42.8	42.8	0.0	
Change Period, $(Y+R_c)$, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	6.0	0.0	6.1	6.1	6.1	0.0	
Queue Clearance Time (g_s), s	46.5	16.7		15.5	37.4	37.4		
Green Extension Time (g_e), s	0.0	8.1	0.0	4.2	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	0.07		0.20	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1281	792	0	0	396	177	448	0	42	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time (g_s), s	44.5	14.7	0.0	0.0	13.0	13.5	33.6	35.4	2.2	0.0		
Cycle Queue Clearance Time (g_c), s	44.5	14.7	0.0	0.0	13.0	13.5	33.6	35.4	2.2	0.0		
Capacity *(c)*, veh/h	1207	2032			567	245	464	0	475			
Volume-to-Capacity Ratio *(X)*	1.061	0.390	0.000	0.000	0.698	0.721	0.965	0.000	0.088	0.000		
Available Capacity (c_a), veh/h	1207	2032			890	385	464	0				
Back of Queue *(Q)*, veh/ln	24.5	5.6			5.8	5.5	17.0		0.9			
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay (d_1), s/veh	37.7	13.1			47.3	47.5	41.7		30.6			
Incremental Delay (d_2), s/veh	43.9	0.6	0.0	0.0	3.3	8.2	33.0	0.0	0.2	0.0		
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	81.6	13.7			50.6	55.7	74.7		30.8			
Level of Service (LOS)	F	B			D	E	E		C			
Approach Delay, s/veh / LOS	55.7	E		52.2	D		71.0	E		0.0		
Intersection Delay s/veh / LOS	57.4						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.2	B	1.0	A	1.3	A		

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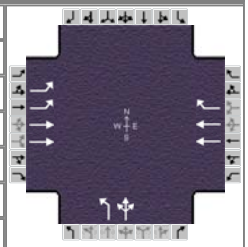
2010 HCS Signalized Intersection Results Summary

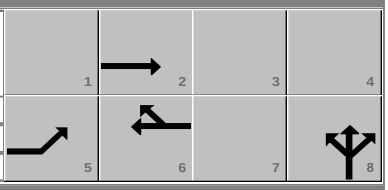
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2012 No Build	Analysis Period	1> 7:00
File Name	3 PM KY 18 & I 75 NB Ramps.xus				
Project Description	Mall Road Interchange				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1150	1250			1250	400	650	0	50			

Signal Information			
Cycle, s	150.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	22.0	60.5	47.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	28.5	95.4	0.0	66.9	54.8	54.8	0.0	
Change Period, *(Y+Rc)*, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	6.0	0.0	6.1	6.1	6.1	0.0	
Queue Clearance Time *(g_s)*, s	24.0	39.2		56.5	49.4	49.4		
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	4.0	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	1.00		1.00	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1198	1302	0	0	1302	417	677	0	52	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time *(g_s)*, s	22.0	37.2	0.0	0.0	54.5	34.8	47.4	47.4	3.4	0.0		
Cycle Queue Clearance Time *(g_c)*, s	22.0	37.2	0.0	0.0	54.5	34.8	47.4	47.4	3.4	0.0		
Capacity *(c)*, veh/h	477	2041			1387	600	497	0	508			
Volume-to-Capacity Ratio *(X)*	2.513	0.638	0.000	0.000	0.939	0.694	1.363	0.000	0.102	0.000		
Available Capacity *(c_a)*, veh/h	477	2041			1400	606	497	0				
Back of Queue *(Q)*, veh/ln	54.6	15.0			25.2	13.3	42.8		1.4			
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay *(d_1)*, s/veh	64.1	20.1			43.1	37.2	51.4		36.3			
Incremental Delay *(d_2)*, s/veh	687.0	1.5	0.0	0.0	12.6	4.4	176.1	0.0	0.2	0.0		
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	751.1	21.6			55.7	41.6	227.5		36.5			
Level of Service (LOS)	F	C			E	D	F		D			
Approach Delay, s/veh / LOS	371.2	F		52.2	D		213.8	F		0.0		
Intersection Delay s/veh / LOS	237.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.6	B	1.9	A	1.7	A		

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: AM Peak Hour No Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2012
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1210			510	
Peak-Hour Factor, PHF		0.85			0.92	
Hourly Flow Rate, HFR		1423			554	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	140		460			
Peak Hour Factor, PHF	0.76		0.96			
Hourly Flow Rate, HFR	184		479			
Percent Heavy Vehicles	7		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			184		479			
C(m) (vph)			152		418			
v/c			1.21		1.15			
95% queue length			10.54		17.75			
Control Delay			199.1		120.7			
LOS			F		F			
Approach Delay				142.5				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: PM Peak Hour No Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2012
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		950			1200	
Peak-Hour Factor, PHF		0.94			0.83	
Hourly Flow Rate, HFR		1010			1445	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

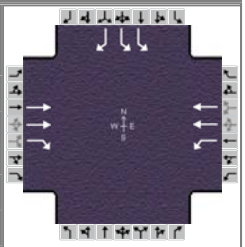
Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	150		400			
Peak Hour Factor, PHF	0.83		0.89			
Hourly Flow Rate, HFR	180		449			
Percent Heavy Vehicles	5		5			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			180		449			
C(m) (vph)			198		557			
v/c			0.91		0.81			
95% queue length			7.17		7.88			
Control Delay			91.4		33.0			
LOS			F		D			
Approach Delay				49.7				
Approach LOS				E				

2010 HCS Signalized Intersection Results Summary

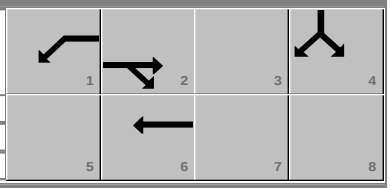
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.90
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2012	Analysis Period	1> 7:00
File Name	5 AM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1360	100	170	480					630		310

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	19.5	80.8	42.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	134.0	26.0	160.0	0.0		47.5	47.5
Change Period, *(Y+Rc)*, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.6	4.6
Queue Clearance Time *(g_s)*, s			20.0				44.0	44.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1511	111	189	533	0	0			700	0	344
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1477	1660	1630	0	0			1597	0	1464
Queue Service time *(g_s)*, s	0.0	63.5	6.4	18.0	3.7	0.0	0.0			33.1	42.0	36.3
Cycle Queue Clearance Time *(g_c)*, s	0.0	63.5	6.4	18.0	3.7	0.0	0.0			33.1	42.0	36.3
Capacity *(c)*, veh/h		1646	746	202	2175					839	0	384
Volume-to-Capacity Ratio *(X)*	0.000	0.918	0.149	0.934	0.245	0.000	0.000			0.835	0.000	0.896
Available Capacity *(c_a)*, veh/h		1646	746	202	2175					839	0	384
Back of Queue *(Q)*, veh/ln		22.1	2.3	10.1	1.1					14.1		15.7
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		23.3	21.2	69.6	3.1					55.7	0.0	56.9
Incremental Delay *(d_2)*, s/veh	0.0	9.7	0.4	45.0	0.3	0.0	0.0			7.4	0.0	23.0
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		33.0	21.6	114.6	3.4					63.2	0.0	79.9
Level of Service (LOS)		C	C	F	A					E		E
Approach Delay, s/veh / LOS	32.2	C		32.5	C		0.0			68.7	E	
Intersection Delay s/veh / LOS	43.5						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	1.8	A	1.1	A				F

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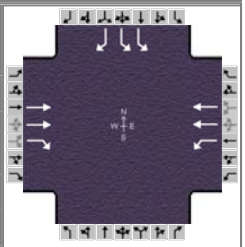
2010 HCS Signalized Intersection Results Summary

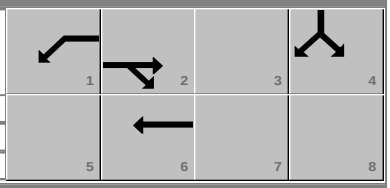
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.97
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2012	Analysis Period	1> 7:00
File Name	5 PM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1100	300	400	950					400		700

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	14.5	82.8	45.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	139.0	21.0	160.0	0.0		50.5	50.5
Change Period, *(Y+Rc)*, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.7	4.7
Queue Clearance Time *(g_s)*, s			16.5				47.0	47.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1134	309	412	979	0	0			412	0	722
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1563	1757	1630	0	0			1689	0	1548
Queue Service time *(g_s)*, s	0.0	32.2	19.0	14.5	10.8	0.0	0.0			16.0	45.0	45.0
Cycle Queue Clearance Time *(g_c)*, s	0.0	32.2	19.0	14.5	10.8	0.0	0.0			16.0	45.0	45.0
Capacity *(c)*, veh/h		1687	809	159	2114					950	0	435
Volume-to-Capacity Ratio *(X)*	0.000	0.672	0.382	2.590	0.463	0.000	0.000			0.434	0.000	1.657
Available Capacity *(c_a)*, veh/h		1687	809	159	2114					950	0	435
Back of Queue *(Q)*, veh/ln		10.4	7.3	38.9	2.8					6.8		54.3
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		17.0	23.2	72.8	4.5					47.1	0.0	57.5
Incremental Delay *(d_2)*, s/veh	0.0	2.2	1.4	733.5	0.7	0.0	0.0			0.4	0.0	305.9
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		19.1	24.6	806.3	5.3					47.5	0.0	363.4
Level of Service (LOS)		B	C	F	A					D		F
Approach Delay, s/veh / LOS	20.3	C		242.6	F		0.0			248.5	F	
Intersection Delay s/veh / LOS	163.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	1.7	A	1.6	A				F

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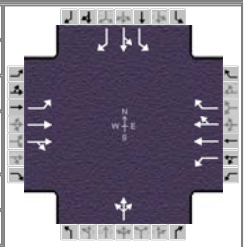
2010 HCS Signalized Intersection Results Summary

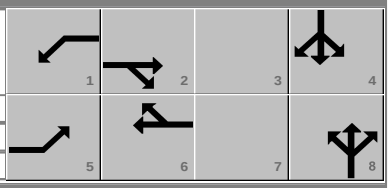
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.84
Intersection	US 42 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	6 AM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	300	1290	10	20	570	200	10	20	20	150	10	120

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	5.0	27.4	67.1	20.8	7.5	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	45.4	134.5	11.5	100.6	14.0	14.0	27.3	27.3
Change Period, $(Y+R_c)$, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time (g_s), s	37.2		4.1		7.4	7.4	19.6	19.6
Green Extension Time (g_e), s	1.8	0.0	0.0	0.0	0.2	0.2	1.2	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.00	0.00	0.04	0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	357	775	773	24	679	238	60	0	0	179	12	143
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1587	1712	1707	1810	1712	1412	1756	0	0	1587	1900	1412
Queue Service time (g_s), s	35.2	28.9	29.4	2.1	19.0	18.8	5.4	0.0	0.0	17.6	0.9	15.7
Cycle Queue Clearance Time (g_c), s	35.2	28.9	29.4	2.1	19.0	18.8	5.4	0.0	0.0	17.6	0.9	15.7
Capacity *(c)*, veh/h	386	1080	1077	57	1435	592	82			206	247	184
Volume-to-Capacity Ratio *(X)*	0.925	0.717	0.718	0.421	0.473	0.402	0.723	0.000	0.000	0.865	0.048	0.778
Available Capacity (c_a), veh/h	801	1080	1077	324	1435	592	282			313	374	278
Back of Queue *(Q)*, veh/ln	15.2	6.6	6.7	1.1	7.2	6.8	2.7			8.0	0.4	6.1
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	59.1	7.0	7.1	76.1	24.7	32.5	75.2			68.2	60.9	67.4
Incremental Delay (d_2), s/veh	11.3	4.1	4.1	5.9	1.1	2.0	13.4	0.0	0.0	16.2	0.1	8.9
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	70.4	11.0	11.3	82.0	25.8	34.5	88.6			84.4	61.0	76.2
Level of Service (LOS)	E	B	B	F	C	C	F			F	E	E
Approach Delay, s/veh / LOS	22.3	C		29.4	C		88.6	F		80.1	F	
Intersection Delay s/veh / LOS	31.5						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	2.1	B	1.3	A	0.6	A	1.0	A

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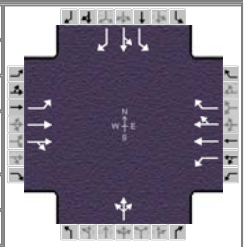
2010 HCS Signalized Intersection Results Summary

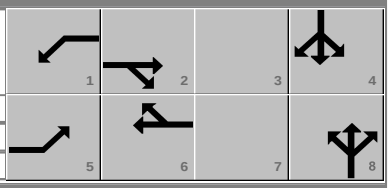
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.98
Intersection	US 42 & Mall Rd	Analysis Year	2012	Analysis Period	1> 7:00
File Name	6 PM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	330	940	30	20	1230	400	30	20	20	440	20	640

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	5.0	24.7	58.1	31.5	8.5	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	42.7	133.5	11.5	102.3	15.0	15.0	38.0	38.0
Change Period, *(Y+Rc)*, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time *(g_s)*, s	36.1		3.8		8.4	8.4	33.5	33.5
Green Extension Time *(g_e)*, s	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.00		0.15	0.15	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	337	498	492	20	1255	408	71	0	0	449	20	653
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1560	1712	1693	1810	1712	1388	1771	0	0	1560	1900	1388
Queue Service time *(g_s)*, s	34.1	19.4	20.1	1.8	58.1	42.4	6.4	0.0	0.0	31.5	1.4	31.5
Cycle Queue Clearance Time *(g_c)*, s	34.1	19.4	20.1	1.8	58.1	42.4	6.4	0.0	0.0	31.5	1.4	31.5
Capacity *(c)*, veh/h	353	956	945	57	1243	504	94			307	374	273
Volume-to-Capacity Ratio *(X)*	0.953	0.521	0.521	0.361	1.010	0.810	0.763	0.000	0.000	1.462	0.055	2.390
Available Capacity *(c_a)*, veh/h	361	956	945	362	1243	504	166			307	374	273
Back of Queue *(Q)*, veh/ln	16.8	6.2	6.5	0.9	27.1	16.3	3.3			31.6	0.7	59.3
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	61.0	11.5	12.1	75.9	41.3	46.0	74.8			64.3	52.2	64.3
Incremental Delay *(d_2)*, s/veh	35.1	2.0	2.0	4.6	27.9	13.2	14.2	0.0	0.0	225.0	0.1	636.5
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	96.1	13.5	14.2	80.5	69.1	59.1	89.0			289.3	52.2	700.8
Level of Service (LOS)	F	B	B	F	F	E	F			F	D	F
Approach Delay, s/veh / LOS	34.7	C		66.9	E		89.0	F		524.4	F	
Intersection Delay s/veh / LOS	179.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.6	A	1.9	A	0.6	A	2.3	B

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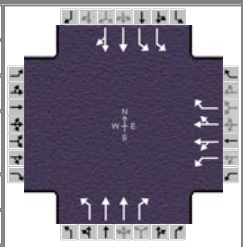
2010 HCS Signalized Intersection Results Summary

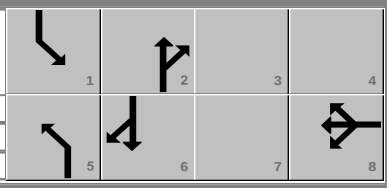
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.84
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2012	Analysis Period	1> 7:00
File Name	7 AM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				80	60	110	10	260	260	110	170	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	1.1	78.0	16.3	0.0	0.0
Yellow	3.5	0.0	4.4	4.0	0.0	0.0
Red	3.0	0.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		22.2	22.2	12.5	106.4	13.6	107.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.2	6.2	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			13.8	13.8	2.9		6.6	
Green Extension Time (g_e), s	0.0		2.5	2.5	0.0	0.0	0.5	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			0.00	0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			95	71	131	12	310	310	131	108	107
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1436	1508	1278	1587	1587	1533	1673	1667	1634
Queue Service time (g_s), s	0.0			7.4	2.5	11.8	0.9	1.8	10.6	4.6	1.0	1.2
Cycle Queue Clearance Time (g_c), s	0.0			7.4	2.5	11.8	0.9	1.8	10.6	4.6	1.0	1.2
Capacity *(c)*, veh/h				195	410	174	79	2063	997	198	1099	1077
Volume-to-Capacity Ratio *(X)*	0.000			0.488	0.174	0.754	0.150	0.150	0.311	0.662	0.098	0.099
Available Capacity (c_a), veh/h				479	1005	426	764	2063	997	1026	1099	1077
Back of Queue *(Q)*, veh/ln				2.8	1.0	4.4	0.4	0.6	3.5	2.0	0.4	0.4
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				48.0	45.9	49.9	54.6	2.9	9.2	55.3	2.5	3.1
Incremental Delay (d_2), s/veh	0.0			4.0	0.4	13.1	0.9	0.2	0.8	3.8	0.2	0.2
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				52.0	46.3	63.1	55.4	3.1	10.0	59.0	2.7	3.3
Level of Service (LOS)				D	D	E	E	A	B	E	A	A
Approach Delay, s/veh / LOS	0.0			55.5	E		7.5	A		24.2	C	
Intersection Delay s/veh / LOS	23.2						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			0.7	A	1.0	A	0.8	A

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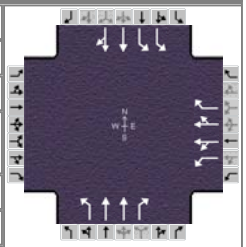
2010 HCS Signalized Intersection Results Summary

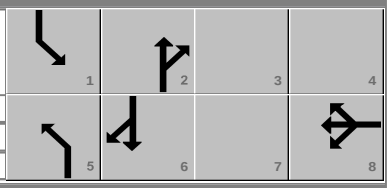
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.97
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2012	Analysis Period	1> 7:00
File Name	7 PM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				110	180	150	50	340	360	150	240	20

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	2.1	98.2	24.0	0.0	0.0
Yellow	3.5	0.0	4.4	4.0	0.0	0.0
Red	3.0	0.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		29.9	29.9	13.5	134.3	15.7	136.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.2	6.2	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			20.9	20.9	6.9		8.6	
Green Extension Time (g_e), s	0.0		3.1	3.1	0.2	0.0	0.5	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			0.18	0.18	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			113	186	155	52	351	371	155	135	133
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1331	1397	1184	1560	1559	1579	1723	1638	1594
Queue Service time (g_s), s	0.0			11.7	9.0	18.9	4.9	2.5	15.9	6.6	1.5	2.0
Cycle Queue Clearance Time (g_c), s	0.0			11.7	9.0	18.9	4.9	2.5	15.9	6.6	1.5	2.0
Capacity *(c)*, veh/h				213	447	189	73	2043	1034	210	1096	1066
Volume-to-Capacity Ratio *(X)*	0.000			0.533	0.415	0.817	0.704	0.172	0.359	0.735	0.123	0.125
Available Capacity (c_a), veh/h				310	652	276	521	2043	1034	692	1096	1066
Back of Queue *(Q)*, veh/ln				4.2	3.3	6.6	2.2	0.8	5.7	3.1	0.6	0.7
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				57.9	56.7	60.9	70.5	3.4	11.7	69.2	2.8	3.7
Incremental Delay (d_2), s/veh	0.0			4.4	1.3	18.3	11.6	0.2	1.0	4.9	0.2	0.2
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				62.2	58.0	79.1	82.1	3.6	12.6	74.2	3.0	3.9
Level of Service (LOS)				E	E	E	F	A	B	E	A	A
Approach Delay, s/veh / LOS	0.0			66.3	E		13.2	B		29.3	C	
Intersection Delay s/veh / LOS	31.9						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			0.9	A	1.1	A	0.8	A

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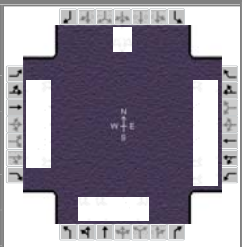
2010 HCS Signalized Intersection Results Summary

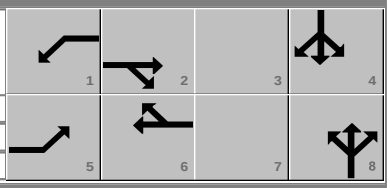
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	1 AM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	2210	160	160	1530	10	110	70	70	20	50	20

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	1.1	66.1	8.6	9.0	0.0
Yellow	3.5	0.0	4.8	4.0	4.0	0.0
Red	3.0	0.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	88.4	15.6	89.5	16.0	16.0	15.6	15.6
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.1	4.1	4.0	4.0
Queue Clearance Time (g_s), s	3.4		8.5		8.2	8.2	8.6	8.6
Green Extension Time (g_e), s	0.0	0.0	0.6	0.0	0.8	0.8	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.00	0.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	21	2351	170	170	1628	11	117	74	74	96	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1412	1541	1643	1533	1541	1810	1412	1722	0	0
Queue Service time (g_s), s	1.4	32.7	7.4	6.5	17.9	0.4	4.4	4.8	6.2	6.6	0.0	0.0
Cycle Queue Clearance Time (g_c), s	1.4	32.7	7.4	6.5	17.9	0.4	4.4	4.8	6.2	6.6	0.0	0.0
Capacity *(c)*, veh/h	115	2990	778	234	2760	859	231	136	106	123		
Volume-to-Capacity Ratio *(X)*	0.185	0.786	0.219	0.728	0.590	0.012	0.507	0.549	0.704	0.775	0.000	0.000
Available Capacity (c_a), veh/h	365	2990	778	909	2760	859	627	368	287	158		
Back of Queue *(Q)*, veh/ln	0.6	8.2	2.3	2.6	4.5	0.1	1.7	2.2	2.4	3.3		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	52.9	11.5	13.8	54.2	9.0	11.7	53.4	53.5	54.2	54.7		
Incremental Delay (d_2), s/veh	0.8	2.2	0.6	4.3	0.9	0.0	1.7	3.4	8.2	16.6	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	53.7	13.7	14.4	58.5	9.9	11.7	55.1	57.0	62.4	71.3		
Level of Service (LOS)	D	B	B	E	A	B	E	E	E	E		
Approach Delay, s/veh / LOS	14.0	B		14.5	B		57.7	E		71.3	E	
Intersection Delay s/veh / LOS	17.8						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	1.9	A	1.5	A	0.9	A	0.6	A

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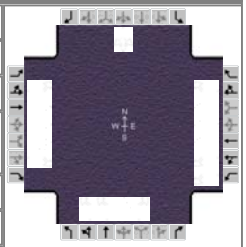
2010 HCS Signalized Intersection Results Summary

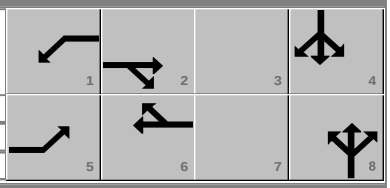
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	1 PM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	2050	800	620	2200	180	670	110	250	200	150	30

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	10.5	44.8	20.0	33.0	0.0
Yellow	3.5	3.5	4.8	4.0	4.0	0.0
Red	3.0	3.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	78.5	31.5	95.5	40.0	40.0	27.0	27.0
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.1	4.1	4.0	4.0
Queue Clearance Time (g_s), s	6.5		27.0		35.0	35.0	22.0	22.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.16		1.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	53	2181	851	660	2340	191	713	117	266	404	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1388	1515	1643	1533	1515	1810	1388	1739	0	0
Queue Service time (g_s), s	4.5	44.8	44.8	25.0	61.8	12.6	33.0	8.1	27.7	20.0	0.0	0.0
Cycle Queue Clearance Time (g_c), s	4.5	44.8	44.8	25.0	61.8	12.6	33.0	8.1	27.7	20.0	0.0	0.0
Capacity *(c)*, veh/h	92	1621	415	505	2031	632	666	398	305	232		
Volume-to-Capacity Ratio *(X)*	0.579	1.345	2.053	1.306	1.152	0.303	1.069	0.294	0.871	1.743	0.000	0.000
Available Capacity (c_a), veh/h	138	1621	415	505	2031	632	666	398	305	232		
Back of Queue *(Q)*, veh/ln	2.1	42.2	70.7	20.1	35.1	4.8	17.4	3.7	11.5	31.4		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	69.4	45.1	52.6	62.5	33.8	29.6	58.5	48.8	56.4	65.0		
Incremental Delay (d_2), s/veh	5.6	159.5	482.1	151.7	74.8	1.2	54.9	0.4	22.8	351.9	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	75.0	204.6	534.7	214.2	108.6	30.9	113.4	49.2	79.2	416.9		
Level of Service (LOS)	E	F	F	F	F	C	F	D	E	F		
Approach Delay, s/veh / LOS	293.5	F		125.7	F		98.3	F		416.9	F	
Intersection Delay s/veh / LOS	203.5						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	2.2	B	2.2	B	2.3	B	1.2	A

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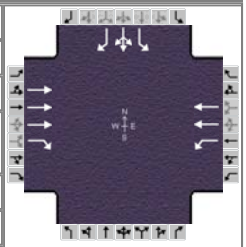
2010 HCS Signalized Intersection Results Summary

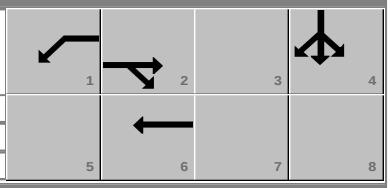
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.93
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2040	Analysis Period	1> 7:00
File Name	2 AM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1950	350	100	1100					350	0	600

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	10.5	65.7	24.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	103.0	17.0	120.0	0.0		30.8	30.8
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time (g_s), s			10.3				26.5	26.5
Green Extension Time (g_e), s	0.0	0.0	0.2	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			0.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	2097	376	108	1183	0	0			376	0	645
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1365	1533	1723	0	0			1616	1900	1438
Queue Service time (g_s), s	0.0	31.8	20.7	8.3	6.2	0.0	0.0			24.5	0.0	24.5
Cycle Queue Clearance Time (g_c), s	0.0	31.8	20.7	8.3	6.2	0.0	0.0			24.5	0.0	24.5
Capacity *(c)*, veh/h		2700	747	134	2374					330	388	294
Volume-to-Capacity Ratio *(X)*	0.000	0.777	0.504	0.804	0.498	0.000	0.000			1.141	0.000	2.198
Available Capacity (c_a), veh/h		2700	747	294	2374					330	388	294
Back of Queue *(Q)*, veh/ln		7.4	6.5	3.5	1.4					18.1	0.0	53.3
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay (d_1), s/veh		11.6	16.9	53.8	1.8					47.8	0.0	47.8
Incremental Delay (d_2), s/veh	0.0	2.3	2.4	10.6	0.7	0.0	0.0			93.4	0.0	550.1
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		13.9	19.4	64.4	2.5					141.2	0.0	597.9
Level of Service (LOS)		B	B	E	A					F		F
Approach Delay, s/veh / LOS	14.7	B		7.7	A		0.0			429.6	F	
Intersection Delay s/veh / LOS	101.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	1.8	A	1.6	A			2.2	B

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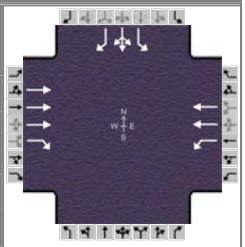
2010 HCS Signalized Intersection Results Summary

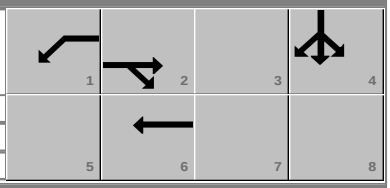
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.97
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2040	Analysis Period	1> 7:00
File Name	2 PM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		2100	400	350	1550					450	0	1450

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	22.0	70.2	38.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	121.5	28.5	150.0	0.0		44.8	44.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time *(g_s)*, s			24.0				40.5	40.5
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	2165	412	361	1598	0	0			464	0	1495
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1477	1660	1723	0	0			1587	1900	1412
Queue Service time *(g_s)*, s	0.0	59.8	30.9	22.0	22.4	0.0	0.0			38.5	0.0	38.5
Cycle Queue Clearance Time *(g_c)*, s	0.0	59.8	30.9	22.0	22.4	0.0	0.0			38.5	0.0	38.5
Capacity *(c)*, veh/h		2307	691	243	2267					407	488	363
Volume-to-Capacity Ratio *(X)*	0.000	0.938	0.596	1.482	0.705	0.000	0.000			1.139	0.000	4.123
Available Capacity *(c_a)*, veh/h		2307	691	243	2267					407	488	363
Back of Queue *(Q)*, veh/ln		20.9	11.4	25.2	4.3					25.0	0.0	155.6
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		26.2	29.4	64.0	4.5					55.8	0.0	55.8
Incremental Delay *(d_2)*, s/veh	0.0	9.0	3.8	237.6	1.9	0.0	0.0			88.1	0.0	1412.1
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		35.2	33.2	301.6	6.4					143.9	0.0	1467.8
Level of Service (LOS)		D	C	F	A					F		F
Approach Delay, s/veh / LOS	34.9	C		60.8	E		0.0			1154.3	F	
Intersection Delay s/veh / LOS	380.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	1.9	A	2.1	B			3.7	D

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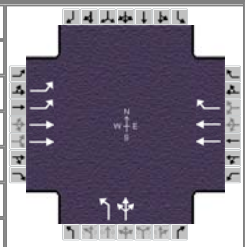
2010 HCS Signalized Intersection Results Summary

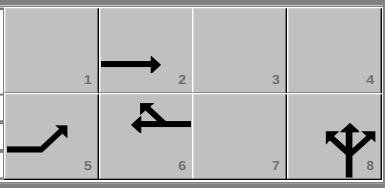
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2040 Build	Analysis Period	1> 7:00
File Name	3 AM KY 18 & I 75 NB Ramps.xus				
Project Description	Mall Road Interchange				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1600	700			550	200	650	0	200			

Signal Information			
Cycle, s	120.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	39.0	25.4	35.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	45.5	77.3	0.0	31.8	42.8	42.8	0.0	
Change Period, $(Y+R_c)$, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	6.0	0.0	6.1	6.2	6.2	0.0	
Queue Clearance Time (g_s), s	41.0	15.2		20.9	37.4	37.4		
Green Extension Time (g_e), s	0.0	6.9	0.0	4.5	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	0.09		0.62	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1667	729	0	0	573	208	677	0	208	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time (g_s), s	39.0	13.2	0.0	0.0	18.9	15.4	35.4	35.4	12.6	0.0		
Cycle Queue Clearance Time (g_c), s	39.0	13.2	0.0	0.0	18.9	15.4	35.4	35.4	12.6	0.0		
Capacity *(c)*, veh/h	1057	2034			729	315	464	0	475			
Volume-to-Capacity Ratio *(X)*	1.577	0.359	0.000	0.000	0.786	0.661	1.460	0.000	0.439	0.000		
Available Capacity (c_a), veh/h	1057	2034			889	385	464	0				
Back of Queue *(Q)*, veh/ln	54.0	5.0			8.5	6.1	41.6		5.1			
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay (d_1), s/veh	40.5	12.8			44.8	43.4	42.3		34.3			
Incremental Delay (d_2), s/veh	264.4	0.5	0.0	0.0	5.3	5.4	218.6	0.0	1.4	0.0		
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	304.9	13.3			50.1	48.8	260.9		35.7			
Level of Service (LOS)	F	B			D	D	F		D			
Approach Delay, s/veh / LOS	216.2	F		49.8	D		207.9	F		0.0		
Intersection Delay s/veh / LOS	182.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.5	B	1.1	A	1.9	A		

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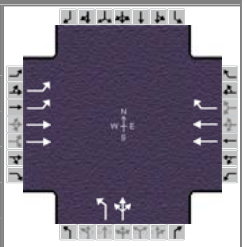
2010 HCS Signalized Intersection Results Summary

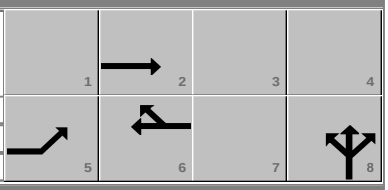
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2040 Build	Analysis Period	1> 7:00
File Name	3 PM KY 18 & I 75 NB Ramps.xus				
Project Description	Mall Road Interchange				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1100	1450			1250	400	650	0	150			

Signal Information			
Cycle, s	150.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	22.0	60.5	47.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	28.5	95.4	0.0	66.9	54.8	54.8	0.0	
Change Period, *(Y+Rc)*, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	6.0	0.0	6.1	6.2	6.2	0.0	
Queue Clearance Time *(g_s)*, s	24.0	49.8		56.5	49.4	49.4		
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	4.0	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	1.00		1.00	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1146	1510	0	0	1302	417	677	0	156	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time *(g_s)*, s	22.0	47.8	0.0	0.0	54.5	34.8	47.4	47.4	11.0	0.0		
Cycle Queue Clearance Time *(g_c)*, s	22.0	47.8	0.0	0.0	54.5	34.8	47.4	47.4	11.0	0.0		
Capacity *(c)*, veh/h	477	2041			1387	600	497	0	508			
Volume-to-Capacity Ratio *(X)*	2.404	0.740	0.000	0.000	0.939	0.694	1.363	0.000	0.307	0.000		
Available Capacity *(c_a)*, veh/h	477	2041			1400	606	497	0				
Back of Queue *(Q)*, veh/ln	51.3	19.4			25.2	13.3	42.8		4.5			
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay *(d_1)*, s/veh	64.1	22.2			43.1	37.2	51.4		38.9			
Incremental Delay *(d_2)*, s/veh	638.1	2.5	0.0	0.0	12.6	4.4	176.1	0.0	0.7	0.0		
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	702.1	24.7			55.7	41.6	227.5		39.7			
Level of Service (LOS)	F	C			E	D	F		D			
Approach Delay, s/veh / LOS	316.9	F		52.2	D		192.2	F		0.0		
Intersection Delay s/veh / LOS	209.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.7	B	1.9	A	1.9	A		

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: AM Peak Hour Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2040
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1200			500	
Peak-Hour Factor, PHF		0.85			0.92	
Hourly Flow Rate, HFR		1411			543	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	200		400			
Peak Hour Factor, PHF	0.76		0.96			
Hourly Flow Rate, HFR	263		416			
Percent Heavy Vehicles	7		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			263		416			
C(m) (vph)			154		421			
v/c			1.71		0.99			
95% queue length			18.86		12.18			
Control Delay			395.8		72.6			
LOS			F		F			
Approach Delay				197.8				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: PM Peak Hour Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2040
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1550			1250	
Peak-Hour Factor, PHF		0.94			0.83	
Hourly Flow Rate, HFR		1648			1506	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

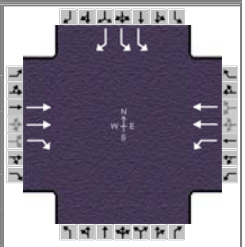
Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	250		300			
Peak Hour Factor, PHF	0.83		0.89			
Hourly Flow Rate, HFR	301		337			
Percent Heavy Vehicles	5		5			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			301		337			
C(m) (vph)			104		364			
v/c			2.89		0.93			
95% queue length			28.58		9.68			
Control Delay			942.0		64.5			
LOS			F		F			
Approach Delay				478.5				
Approach LOS				F				

2010 HCS Signalized Intersection Results Summary

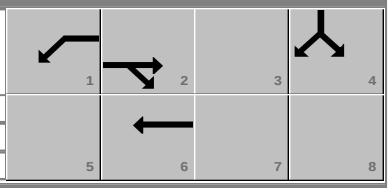
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.90
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2040	Analysis Period	1> 7:00
File Name	5 AM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1300	100	150	550					800		450

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	17.9	82.4	42.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	135.6	24.4	160.0	0.0		47.5	47.5
Change Period, $(Y+R_c)$, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.7	4.7
Queue Clearance Time (g_s), s			17.9				44.0	44.0
Green Extension Time (g_e), s	0.0	0.0	0.1	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1444	111	167	611	0	0			889	0	500
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1477	1660	1630	0	0			1597	0	1464
Queue Service time (g_s), s	0.0	54.4	6.3	15.9	4.4	0.0	0.0			42.0	42.0	42.0
Cycle Queue Clearance Time (g_c), s	0.0	54.4	6.3	15.9	4.4	0.0	0.0			42.0	42.0	42.0
Capacity *(c)*, veh/h		1677	760	186	2175					839	0	384
Volume-to-Capacity Ratio *(X)*	0.000	0.861	0.146	0.895	0.281	0.000	0.000			1.060	0.000	1.301
Available Capacity (c_a), veh/h		1677	760	202	2175					839	0	384
Back of Queue *(Q)*, veh/ln		18.2	2.3	8.5	1.3					22.4		31.7
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay (d_1), s/veh		20.7	20.4	70.1	3.2					59.0	0.0	59.0
Incremental Delay (d_2), s/veh	0.0	6.1	0.4	35.0	0.3	0.0	0.0			48.2	0.0	153.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		26.8	20.8	105.1	3.5					107.2	0.0	212.4
Level of Service (LOS)		C	C	F	A					F		F
Approach Delay, s/veh / LOS	26.3	C		25.3	C		0.0			145.1	F	
Intersection Delay s/veh / LOS	70.4						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	1.8	A	1.1	A				F

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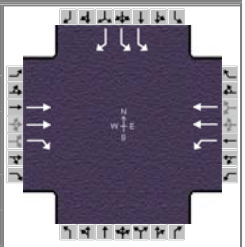
2010 HCS Signalized Intersection Results Summary

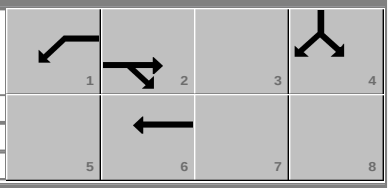
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.97
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2040	Analysis Period	1> 7:00
File Name	5 PM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1600	400	400	1100					500		900

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	14.5	82.8	45.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	139.0	21.0	160.0	0.0		50.5	50.5
Change Period, $(Y+R_c)$, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.7	4.7
Queue Clearance Time (g_s), s			16.5				47.0	47.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1649	412	412	1134	0	0			515	0	928
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1563	1757	1630	0	0			1689	0	1548
Queue Service time (g_s), s	0.0	77.2	27.7	14.5	14.0	0.0	0.0			20.7	45.0	45.0
Cycle Queue Clearance Time (g_c), s	0.0	77.2	27.7	14.5	14.0	0.0	0.0			20.7	45.0	45.0
Capacity *(c)*, veh/h		1687	809	159	2114					950	0	435
Volume-to-Capacity Ratio *(X)*	0.000	0.978	0.510	2.590	0.536	0.000	0.000			0.542	0.000	2.131
Available Capacity (c_a), veh/h		1687	809	159	2114					950	0	435
Back of Queue *(Q)*, veh/ln		27.7	10.7	38.9	3.4					8.8		79.8
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay (d_1), s/veh		23.9	25.3	72.8	4.7					48.8	0.0	57.5
Incremental Delay (d_2), s/veh	0.0	17.3	2.3	733.5	1.0	0.0	0.0			0.7	0.0	516.5
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		41.2	27.6	806.3	5.7					49.5	0.0	574.0
Level of Service (LOS)		D	C	F	A					D		F
Approach Delay, s/veh / LOS	38.5	D		219.2	F		0.0			386.7	F	
Intersection Delay s/veh / LOS	193.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	2.2	B	1.8	A				F

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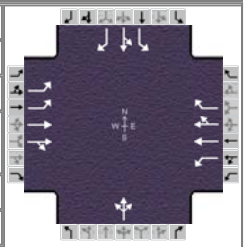
2010 HCS Signalized Intersection Results Summary

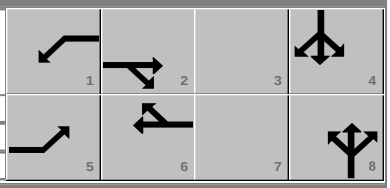
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.84
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 AM US 42 & Mall Rd with added turn lane.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	300	1200	30	100	750	150	20	50	50	150	50	300

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	10.6	4.9	65.9	31.5	14.9	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	28.5	121.5	17.1	110.1	21.4	21.4	38.0	38.0
Change Period, *(Y+Rc)*, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time *(g_s)*, s	20.1		12.5		14.9	14.9	33.5	33.5
Green Extension Time *(g_e)*, s	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	357	735	730	119	893	179	143	0	0	179	60	357
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1541	1712	1697	1810	1712	1412	1754	0	0	1587	1900	1412
Queue Service time *(g_s)*, s	18.1	57.1	57.7	10.5	28.8	13.6	12.9	0.0	0.0	16.3	4.2	31.5
Cycle Queue Clearance Time *(g_c)*, s	18.1	57.1	57.7	10.5	28.8	13.6	12.9	0.0	0.0	16.3	4.2	31.5
Capacity *(c)*, veh/h	424	827	820	120	1410	582	163			313	374	278
Volume-to-Capacity Ratio *(X)*	0.842	0.888	0.890	0.991	0.633	0.307	0.876	0.000	0.000	0.571	0.159	1.284
Available Capacity *(c_a)*, veh/h	1207	827	820	120	1410	582	164			313	374	278
Back of Queue *(Q)*, veh/ln	7.4	22.6	23.0	7.5	11.1	4.9	7.5			6.8	2.0	23.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	67.3	24.9	25.5	74.6	27.7	31.7	71.7			58.1	53.3	64.3
Incremental Delay *(d_2)*, s/veh	5.5	13.6	13.9	79.1	2.2	1.4	37.6	0.0	0.0	2.8	0.2	152.5
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	72.7	38.5	39.4	153.8	29.9	33.0	109.2			60.9	53.5	216.7
Level of Service (LOS)	E	D	D	F	C	C	F			E	D	F
Approach Delay, s/veh / LOS	45.6	D		42.8	D		109.2	F		153.7	F	
Intersection Delay s/veh / LOS	64.3						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.0	C	3.0	C
Bicycle LOS Score / LOS	2.0	A	1.5	A	0.7	A	1.5	A

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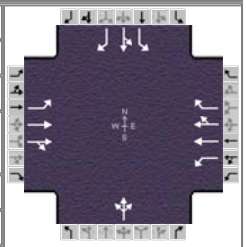
2010 HCS Signalized Intersection Results Summary

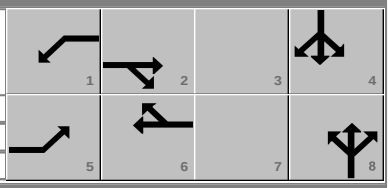
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.84
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 AM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	300	1200	30	100	750	150	20	50	50	150	50	300

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	10.6	21.7	49.1	31.5	14.9	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	45.3	121.5	17.1	93.3	21.4	21.4	38.0	38.0
Change Period, $(Y+R_c)$, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time (g_s), s	37.2		12.5		14.9	14.9	33.5	33.5
Green Extension Time (g_e), s	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	357	735	730	119	893	179	143	0	0	179	60	357
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1587	1712	1697	1810	1712	1412	1754	0	0	1587	1900	1412
Queue Service time (g_s), s	35.2	57.1	57.7	10.5	37.8	16.1	12.9	0.0	0.0	16.3	4.2	31.5
Cycle Queue Clearance Time (g_c), s	35.2	57.1	57.7	10.5	37.8	16.1	12.9	0.0	0.0	16.3	4.2	31.5
Capacity *(c)*, veh/h	385	827	820	120	1050	433	163			313	374	278
Volume-to-Capacity Ratio *(X)*	0.927	0.888	0.890	0.991	0.850	0.412	0.876	0.000	0.000	0.571	0.159	1.284
Available Capacity (c_a), veh/h	621	827	820	120	1050	433	164			313	374	278
Back of Queue *(Q)*, veh/ln	15.6	22.6	23.0	7.5	16.2	6.0	7.5			6.8	2.0	23.0
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	59.2	24.9	25.5	74.6	43.9	44.0	71.7			58.1	53.3	64.3
Incremental Delay (d_2), s/veh	15.1	13.6	13.9	79.1	8.6	2.9	37.6	0.0	0.0	2.8	0.2	152.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	74.3	38.5	39.4	153.8	52.6	46.9	109.2			60.9	53.5	216.7
Level of Service (LOS)	E	D	D	F	D	D	F			E	D	F
Approach Delay, s/veh / LOS	45.9	D		61.8	E		109.2	F		153.7	F	
Intersection Delay s/veh / LOS	70.5						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.5	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	2.0	A	1.5	A	0.7	A	1.5	A

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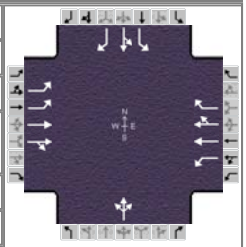
2010 HCS Signalized Intersection Results Summary

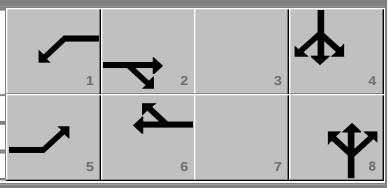
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.98
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 PM US 42 & Mall Rd with added turn lane.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	400	1650	30	100	1100	800	20	50	50	300	50	700

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	11.2	6.8	65.2	31.5	13.1	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	31.0	122.7	17.7	109.4	19.6	19.6	38.0	38.0
Change Period, *(Y+Rc)*, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time *(g_s)*, s	23.1		10.9		13.0	13.0	33.5	33.5
Green Extension Time *(g_e)*, s	1.4	0.0	0.3	0.0	0.1	0.1	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.14		0.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	408	858	856	102	1122	816	122	0	0	306	51	714
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1515	1712	1701	1810	1712	1388	1754	0	0	1560	1900	1388
Queue Service time *(g_s)*, s	21.1	78.5	78.5	8.9	42.6	65.2	11.0	0.0	0.0	31.4	3.5	31.5
Cycle Queue Clearance Time *(g_c)*, s	21.1	78.5	78.5	8.9	42.6	65.2	11.0	0.0	0.0	31.4	3.5	31.5
Capacity *(c)*, veh/h	464	840	835	127	1395	565	144			307	374	273
Volume-to-Capacity Ratio *(X)*	0.879	1.022	1.026	0.806	0.805	1.444	0.853	0.000	0.000	0.997	0.136	2.614
Available Capacity *(c_a)*, veh/h	613	840	835	310	1395	565	164			307	374	273
Back of Queue *(Q)*, veh/ln	8.8	35.1	35.4	4.6	16.8	54.9	6.2			16.6	1.7	66.9
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	66.3	27.7	28.1	73.3	31.4	47.4	72.5			64.2	53.0	64.3
Incremental Delay *(d_2)*, s/veh	11.7	36.7	37.9	13.4	5.0	209.5	30.8	0.0	0.0	50.4	0.2	736.7
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	78.0	64.4	66.0	86.7	36.4	256.9	103.3			114.6	53.2	801.0
Level of Service (LOS)	E	F	F	F	D	F	F			F	D	F
Approach Delay, s/veh / LOS	67.6	E		127.1	F		103.3	F		569.3	F	
Intersection Delay s/veh / LOS	191.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.0	C	3.0	C
Bicycle LOS Score / LOS	2.2	B	2.2	B	0.7	A	2.3	B

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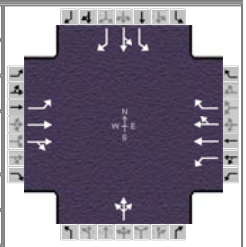
2010 HCS Signalized Intersection Results Summary

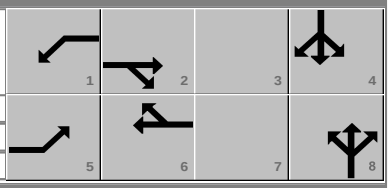
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.98
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 PM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	400	1650	30	100	1100	800	20	50	50	300	50	700

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	11.2	14.7	57.3	31.5	13.1	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	38.9	122.7	17.7	101.5	19.6	19.6	38.0	38.0
Change Period, $(Y+R_c)$, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time (g_s), s	34.4		10.9		13.0	13.0	33.5	33.5
Green Extension Time (g_e), s	0.0	0.0	0.3	0.0	0.1	0.1	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	408	858	856	102	1122	816	122	0	0	306	51	714
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1560	1712	1701	1810	1712	1388	1754	0	0	1560	1900	1388
Queue Service time (g_s), s	32.4	78.5	78.5	8.9	48.7	57.3	11.0	0.0	0.0	31.4	3.5	31.5
Cycle Queue Clearance Time (g_c), s	32.4	78.5	78.5	8.9	48.7	57.3	11.0	0.0	0.0	31.4	3.5	31.5
Capacity *(c)*, veh/h	316	840	835	127	1226	497	144			307	374	273
Volume-to-Capacity Ratio *(X)*	1.292	1.022	1.026	0.806	0.916	1.642	0.853	0.000	0.000	0.997	0.136	2.614
Available Capacity (c_a), veh/h	316	840	835	310	1226	497	164			307	374	273
Back of Queue *(Q)*, veh/ln	26.2	35.1	35.4	4.6	20.8	60.7	6.2			16.6	1.7	66.9
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	63.8	27.7	28.1	73.3	39.6	51.3	72.5			64.2	53.0	64.3
Incremental Delay (d_2), s/veh	153.1	36.7	37.9	13.4	12.1	297.9	30.8	0.0	0.0	50.4	0.2	736.7
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	216.9	64.4	66.0	86.7	51.6	349.3	103.3			114.6	53.2	801.0
Level of Service (LOS)	F	F	F	F	D	F	F			F	D	F
Approach Delay, s/veh / LOS	94.4	F		172.4	F		103.3	F		569.3	F	
Intersection Delay s/veh / LOS	219.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.5	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	2.2	B	2.2	B	0.7	A	2.3	B

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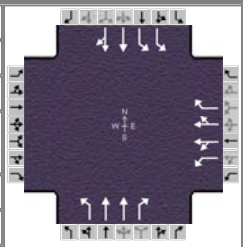
2010 HCS Signalized Intersection Results Summary

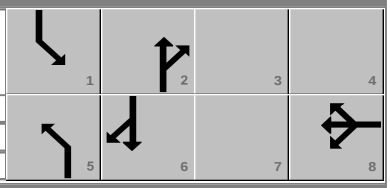
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour Build	PHF	0.84
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2040	Analysis Period	1> 7:00
File Name	7 AM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				100	100	150	10	340	350	150	200	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	2.9	71.1	21.4	0.0	0.0
Yellow	3.5	0.0	4.4	4.0	0.0	0.0
Red	3.0	0.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		27.3	27.3	12.5	104.6	15.4	107.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.2	6.2	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			18.0	18.0	2.9		8.3	
Green Extension Time (g_e), s	0.0		3.4	3.4	0.0	0.0	0.7	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			0.03	0.03	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			119	119	179	12	405	417	179	125	125
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1436	1508	1278	1587	1587	1533	1673	1667	1638
Queue Service time (g_s), s	0.0			8.9	4.1	16.0	0.9	3.9	18.3	6.3	1.8	2.0
Cycle Queue Clearance Time (g_c), s	0.0			8.9	4.1	16.0	0.9	3.9	18.3	6.3	1.8	2.0
Capacity *(c)*, veh/h				256	538	228	79	1879	908	249	1028	1010
Volume-to-Capacity Ratio *(X)*	0.000			0.464	0.221	0.783	0.150	0.215	0.459	0.718	0.122	0.123
Available Capacity (c_a), veh/h				479	1005	426	697	1879	908	884	1028	1010
Back of Queue *(Q)*, veh/ln				3.3	1.5	5.8	0.4	1.2	6.4	2.7	0.7	0.7
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				44.2	42.2	47.1	54.6	5.6	13.7	54.3	4.3	4.7
Incremental Delay (d_2), s/veh	0.0			2.8	0.4	11.8	0.9	0.3	1.7	3.9	0.2	0.3
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				46.9	42.6	58.8	55.4	5.8	15.4	58.2	4.5	5.0
Level of Service (LOS)				D	D	E	E	A	B	E	A	A
Approach Delay, s/veh / LOS	0.0			50.8	D		11.3	B		27.0	C	
Intersection Delay s/veh / LOS	25.1						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			0.8	A	1.2	A	0.8	A

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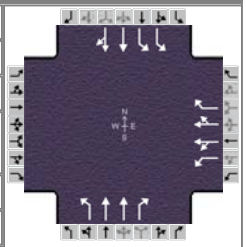
2010 HCS Signalized Intersection Results Summary

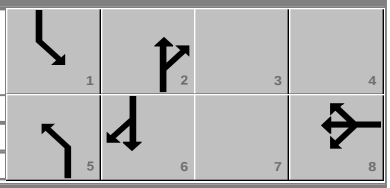
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour Build	PHF	0.97
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2040	Analysis Period	1> 7:00
File Name	7 PM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				440	180	800	60	820	160	320	820	40

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	2.0	79.9	35.0	0.0	0.0
Yellow	3.5	3.5	4.4	4.0	0.0	0.0
Red	3.0	3.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		40.9	40.9	14.5	127.0	23.0	135.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.3	6.3	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			37.0	37.0	7.9		16.1	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.2	0.0	0.4	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			1.00	1.00	0.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			454	186	825	62	845	165	330	447	440
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1331	1397	1184	1560	1559	1579	1723	1638	1611
Queue Service time (g_s), s	0.0			35.0	8.2	35.0	5.9	18.5	8.2	14.1	13.8	14.8
Cycle Queue Clearance Time (g_c), s	0.0			35.0	8.2	35.0	5.9	18.5	8.2	14.1	13.8	14.8
Capacity *(c)*, veh/h				310	652	276	84	1660	840	380	965	949
Volume-to-Capacity Ratio *(X)*	0.000			1.461	0.285	2.985	0.741	0.509	0.196	0.869	0.463	0.463
Available Capacity (c_a), veh/h				310	652	276	407	1660	840	439	965	949
Back of Queue *(Q)*, veh/ln				31.0	2.9	79.7	2.6	5.5	3.1	7.0	4.2	4.6
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				57.5	47.2	57.5	70.0	12.9	18.3	65.7	8.1	8.9
Incremental Delay (d_2), s/veh	0.0			224.5	0.5	903.1	12.0	1.1	0.5	15.2	1.6	1.6
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				282.0	47.7	960.6	82.0	14.0	18.8	80.9	9.7	10.5
Level of Service (LOS)				F	D	F	F	B	B	F	A	B
Approach Delay, s/veh / LOS	0.0			634.6		F	18.6		B	29.3		C
Intersection Delay s/veh / LOS	262.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			1.7	A	1.4	A	1.5	A

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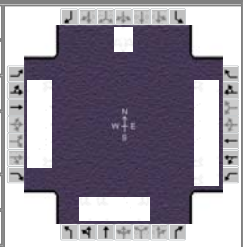
2010 HCS Signalized Intersection Results Summary

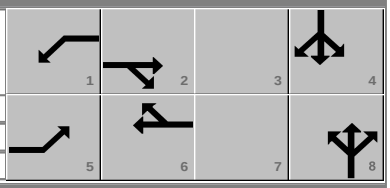
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	1 AM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	2200	170	200	1490	10	120	60	70	30	40	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	2.9	65.1	7.8	9.0	0.0
Yellow	3.5	0.0	4.8	4.0	4.0	0.0
Red	3.0	0.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	86.6	17.4	89.5	16.0	16.0	14.8	14.8
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.1	4.1	4.0	4.0
Queue Clearance Time (g_s), s	2.7		10.1		8.2	8.2	7.8	7.8
Green Extension Time (g_e), s	0.0	0.0	0.8	0.0	0.8	0.8	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.00	0.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	11	2340	181	213	1585	11	128	64	74	85	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1412	1541	1643	1533	1541	1810	1412	1738	0	0
Queue Service time (g_s), s	0.7	33.7	8.1	8.1	16.5	0.4	4.8	4.1	6.2	5.8	0.0	0.0
Cycle Queue Clearance Time (g_c), s	0.7	33.7	8.1	8.1	16.5	0.4	4.8	4.1	6.2	5.8	0.0	0.0
Capacity *(c)*, veh/h	115	2944	766	280	2792	868	232	136	106	113		
Volume-to-Capacity Ratio *(X)*	0.093	0.795	0.236	0.761	0.568	0.012	0.551	0.470	0.702	0.751	0.000	0.000
Available Capacity (c_a), veh/h	376	2944	766	929	2792	868	647	380	296	159		
Back of Queue *(Q)*, veh/ln	0.3	8.8	2.6	3.2	4.2	0.1	1.9	1.9	2.4	2.8		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	52.6	12.3	14.4	53.3	8.4	11.4	53.5	53.2	54.2	55.1		
Incremental Delay (d_2), s/veh	0.3	2.3	0.7	4.3	0.8	0.0	2.0	2.5	8.1	11.7	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	52.9	14.6	15.1	57.5	9.2	11.4	55.6	55.7	62.3	66.8		
Level of Service (LOS)	D	B	B	E	A	B	E	E	E	E		
Approach Delay, s/veh / LOS	14.8	B		14.9	B		57.5	E		66.8	E	
Intersection Delay s/veh / LOS	18.2						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	1.9	A	1.5	A	0.9	A	0.6	A

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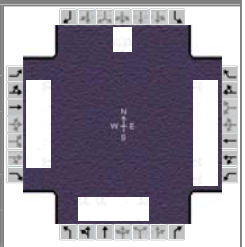
2010 HCS Signalized Intersection Results Summary

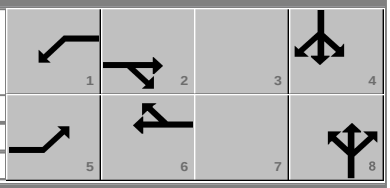
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.94
Intersection	KY 18 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	1 PM KY 18 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	2350	800	600	2200	200	650	110	300	150	140	50

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	8.0	10.5	44.8	20.0	33.0	0.0
Yellow	3.5	3.5	4.8	4.0	4.0	0.0
Red	3.0	3.0	1.9	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	3.0	2.0	3.0	9.0	9.0	12.0	12.0
Phase Duration, s	14.5	78.5	31.5	95.5	40.0	40.0	27.0	27.0
Change Period, $(Y+R_c)$, s	6.5	6.7	6.5	6.7	7.0	7.0	7.0	7.0
Max Allow Headway *(MAH)*, s	4.0	0.0	4.0	0.0	4.1	4.1	4.0	4.0
Queue Clearance Time (g_s), s	6.5		27.0		35.0	35.0	22.0	22.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.16		1.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	53	2500	851	638	2340	213	691	117	319	362	0	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1723	1810	1388	1515	1643	1533	1515	1810	1388	1726	0	0
Queue Service time (g_s), s	4.5	44.8	44.8	25.0	61.8	14.2	33.0	8.1	33.0	20.0	0.0	0.0
Cycle Queue Clearance Time (g_c), s	4.5	44.8	44.8	25.0	61.8	14.2	33.0	8.1	33.0	20.0	0.0	0.0
Capacity *(c)*, veh/h	92	1621	415	505	2031	632	666	398	305	230		
Volume-to-Capacity Ratio *(X)*	0.579	1.542	2.053	1.264	1.152	0.337	1.038	0.294	1.045	1.572	0.000	0.000
Available Capacity (c_a), veh/h	138	1621	415	505	2031	632	666	398	305	230		
Back of Queue *(Q)*, veh/ln	2.1	55.3	70.7	18.8	35.1	5.4	16.5	3.7	16.7	26.4		
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	69.4	45.1	52.6	62.5	33.8	30.1	58.5	48.8	58.5	65.0		
Incremental Delay (d_2), s/veh	5.6	247.0	482.1	134.0	74.8	1.4	44.9	0.4	63.8	277.3	0.0	0.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	75.0	292.1	534.7	196.5	108.6	31.5	103.4	49.2	122.3	342.3		
Level of Service (LOS)	E	F	F	F	F	C	F	D	F	F		
Approach Delay, s/veh / LOS	349.4	F		121.0	F		103.1	F		342.3	F	
Intersection Delay s/veh / LOS	224.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	2.1	B	3.5	D	3.4	C
Bicycle LOS Score / LOS	2.4	B	2.2	B	2.3	B	1.1	A

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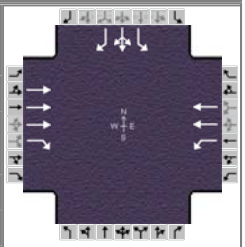
2010 HCS Signalized Intersection Results Summary

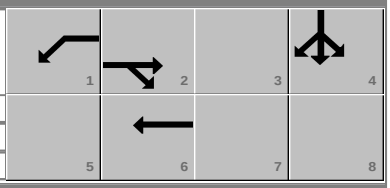
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.93
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2040	Analysis Period	1> 7:00
File Name	2 AM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		2000	300	200	1000					300	0	700

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	18.8	57.4	24.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	94.7	25.3	120.0	0.0		30.8	30.8
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time (g_s), s			18.5				26.5	26.5
Green Extension Time (g_e), s	0.0	0.0	0.3	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			0.72				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	2151	323	215	1075	0	0			323	0	753
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1365	1533	1723	0	0			1616	1900	1438
Queue Service time (g_s), s	0.0	45.3	19.4	16.5	5.2	0.0	0.0			23.8	0.0	24.5
Cycle Queue Clearance Time (g_c), s	0.0	45.3	19.4	16.5	5.2	0.0	0.0			23.8	0.0	24.5
Capacity *(c)*, veh/h		2359	653	240	2374					330	388	294
Volume-to-Capacity Ratio *(X)*	0.000	0.912	0.494	0.896	0.453	0.000	0.000			0.978	0.000	2.564
Available Capacity (c_a), veh/h		2359	653	294	2374					330	388	294
Back of Queue *(Q)*, veh/ln		14.0	6.3	7.8	1.2					13.2	0.0	66.7
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay (d_1), s/veh		19.5	21.4	49.7	1.7					47.5	0.0	47.8
Incremental Delay (d_2), s/veh	0.0	6.7	2.7	24.6	0.6	0.0	0.0			43.4	0.0	713.9
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		26.3	24.0	74.2	2.3					90.9	0.0	761.6
Level of Service (LOS)		C	C	E	A					F		F
Approach Delay, s/veh / LOS	26.0	C		14.3	B		0.0			560.4	F	
Intersection Delay s/veh / LOS	141.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	1.8	A	1.6	A			2.3	B

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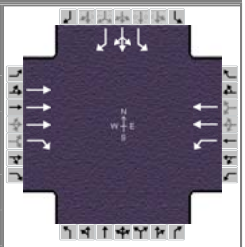
2010 HCS Signalized Intersection Results Summary

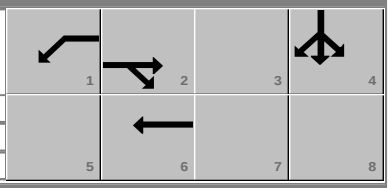
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.97
Intersection	KY 18 & Interstate 75 SB R	Analysis Year	2040	Analysis Period	1> 7:00
File Name	2 PM KY 18 & I 75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		2200	600	350	1600					400	0	1400

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	22.0	70.2	38.5	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.7	1.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	121.5	28.5	150.0	0.0		44.8	44.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	0.0		6.3	6.3
Max Allow Headway *(MAH)*, s	0.0	0.0	4.0	0.0	0.0		4.2	4.2
Queue Clearance Time *(g_s)*, s			24.0				40.5	40.5
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	2268	619	361	1649	0	0			412	0	1443
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1643	1477	1660	1723	0	0			1587	1900	1412
Queue Service time *(g_s)*, s	0.0	67.1	57.5	22.0	24.4	0.0	0.0			38.5	0.0	38.5
Cycle Queue Clearance Time *(g_c)*, s	0.0	67.1	57.5	22.0	24.4	0.0	0.0			38.5	0.0	38.5
Capacity *(c)*, veh/h		2307	691	243	2267					407	488	363
Volume-to-Capacity Ratio *(X)*	0.000	0.983	0.895	1.482	0.728	0.000	0.000			1.012	0.000	3.981
Available Capacity *(c_a)*, veh/h		2307	691	243	2267					407	488	363
Back of Queue *(Q)*, veh/ln		24.6	22.9	25.2	4.5					20.4	0.0	149.1
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		27.6	36.5	64.0	4.6					55.8	0.0	55.8
Incremental Delay *(d_2)*, s/veh	0.0	15.2	16.4	237.6	2.1	0.0	0.0			47.7	0.0	1348.2
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		42.8	52.9	301.6	6.7					103.4	0.0	1403.9
Level of Service (LOS)		D	D	F	A					F		F
Approach Delay, s/veh / LOS	45.0	D		59.7	E		0.0			1114.9	F	
Intersection Delay s/veh / LOS	343.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	1.9	A	3.2	C	3.0	C
Bicycle LOS Score / LOS	2.1	B	2.1	B			3.5	D

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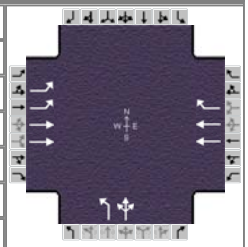
2010 HCS Signalized Intersection Results Summary

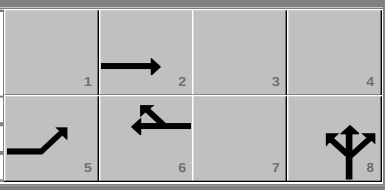
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2040 No Build	Analysis Period	1> 7:00
File Name	3 AM KY 18 & I 75 NB Ramps.xus				
Project Description	Mall Road Interchange				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1850	450			550	50	650	0	50			

Signal Information			
Cycle, s	120.3	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	42.0	22.6	35.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	48.5	77.5	0.0	29.0	42.8	42.8	0.0	
Change Period, *(Y+Rc)*, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	3.0	0.0	3.1	6.1	6.1	0.0	
Queue Clearance Time *(gs)*, s	44.0	9.7		21.5	37.4	37.4		
Green Extension Time *(ge)*, s	0.0	1.1	0.0	1.2	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	0.00		0.02	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1927	469	0	0	573	52	677	0	52	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time *(gs)*, s	42.0	7.7	0.0	0.0	19.5	3.5	35.4	35.4	2.8	0.0		
Cycle Queue Clearance Time *(gc)*, s	42.0	7.7	0.0	0.0	19.5	3.5	35.4	35.4	2.8	0.0		
Capacity *(c)*, veh/h	1136	2037			648	280	463	0	474			
Volume-to-Capacity Ratio *(X)*	1.697	0.230	0.000	0.000	0.884	0.186	1.463	0.000	0.110	0.000		
Available Capacity *(ca)*, veh/h	1136	2037			888	384	463	0				
Back of Queue *(Q)*, veh/ln	66.3	2.9			8.8	1.3	41.7		1.1			
Overflow Queue *(Q3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay *(d1)*, s/veh	39.2	11.6			47.6	41.1	42.5		31.0			
Incremental Delay *(d2)*, s/veh	317.4	0.3	0.0	0.0	6.5	0.1	219.9	0.0	0.2	0.0		
Initial Queue Delay *(d3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	356.6	11.9			54.1	41.2	262.4		31.2			
Level of Service (LOS)	F	B			D	D	F		C			
Approach Delay, s/veh / LOS	289.2	F		53.0	D		245.9	F		0.0		
Intersection Delay s/veh / LOS	241.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.5	B	1.0	A	1.7	A		

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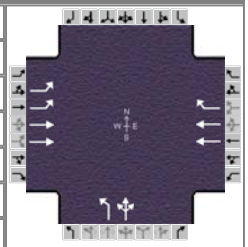
2010 HCS Signalized Intersection Results Summary

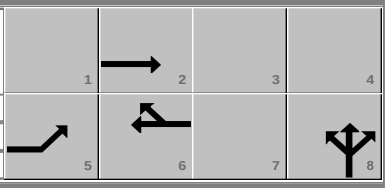
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Jan 2, 2013	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Design Hour	PHF	0.96
Intersection	KY 18 & I75 NB Ramps	Analysis Year	2040 No Build	Analysis Period	1> 7:00
File Name	3 PM KY 18 & I 75 NB Ramps.xus				
Project Description	Mall Road Interchange				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1200	1400			1400	200	550	0	100			

Signal Information			
Cycle, s	152.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	24.0	61.0	47.4	0.0	0.0	0.0
Yellow	3.5	4.8	4.4	0.0	0.0	0.0
Red	3.0	1.6	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	7	
Case Number	2.0	4.0	0.0	3.0	10.0	10.0	0.0	
Phase Duration, s	30.5	97.9	0.0	67.4	54.8	54.8	0.0	
Change Period, *(Y+Rc)*, s	6.5	6.4	5.0	6.4	7.4	7.4	5.0	
Max Allow Headway *(MAH)*, s	6.1	6.0	0.0	6.1	6.2	6.2	0.0	
Queue Clearance Time *(gs)*, s	26.0	46.9		63.0	49.4	49.4		
Green Extension Time *(ge)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Phase Call Probability	1.00	1.00		1.00	1.00	1.00		
Max Out Probability	1.00	1.00		1.00	1.00	1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1250	1458	0	0	1458	208	573	0	104	0		
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1627	1723	0	0	1723	1491	1573	0	1610	0		
Queue Service time *(gs)*, s	24.0	44.9	0.0	0.0	61.0	14.9	47.4	47.4	7.3	0.0		
Cycle Queue Clearance Time *(gc)*, s	24.0	44.9	0.0	0.0	61.0	14.9	47.4	47.4	7.3	0.0		
Capacity *(c)*, veh/h	511	2064			1376	596	488	0	500			
Volume-to-Capacity Ratio *(X)*	2.444	0.706	0.000	0.000	1.060	0.350	1.173	0.000	0.208	0.000		
Available Capacity *(ca)*, veh/h	511	2064			1376	596	488	0				
Back of Queue *(Q)*, veh/ln	56.5	18.2			33.6	5.5	31.8		3.0			
Overflow Queue *(Q3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Uniform Delay *(d1)*, s/veh	64.4	21.3			45.9	32.0	52.7		38.8			
Incremental Delay *(d2)*, s/veh	655.8	2.1	0.0	0.0	41.7	0.8	97.7	0.0	0.4	0.0		
Initial Queue Delay *(d3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Control Delay *(d)*, s/veh	720.2	23.3			87.6	32.8	150.4		39.3			
Level of Service (LOS)	F	C			F	C	F		D			
Approach Delay, s/veh / LOS	345.0	F		80.7	F		133.3	F		0.0		
Intersection Delay s/veh / LOS	229.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.7	B	1.9	A	1.6	A		

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TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: AM Peak Hour No Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2040
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1600			650	
Peak-Hour Factor, PHF		0.85			0.92	
Hourly Flow Rate, HFR		1882			706	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	200		400			
Peak Hour Factor, PHF	0.76		0.96			
Hourly Flow Rate, HFR	263		416			
Percent Heavy Vehicles	7		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			263		416			
C(m) (vph)			86		306			
v/c			3.06		1.36			
95% queue length			25.93		21.13			
Control Delay			1032		214.9			
LOS			F		F			
Approach Delay				531.2				
Approach LOS				F				

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Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: AM Peak Hour No Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2040
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1600			650	
Peak-Hour Factor, PHF		0.85			0.92	
Peak-15 Minute Volume		471			177	
Hourly Flow Rate, HFR		1882			706	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb			/ 1		
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	200		400			
Peak Hour Factor, PHF	0.76		0.96			
Peak-15 Minute Volume	66		104			
Hourly Flow Rate, HFR	263		416			
Percent Heavy Vehicles	7		7			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)			7.5		6.2			
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)			7		7			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)			0.70		0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage			6.9		6.3			
2-stage			5.9		6.3			

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)			3.50		3.30			
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)			7		7			
t(f)			3.6		3.4			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				

Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p	0.000		0.000	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x			2235		941			
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process

7	8	10	11

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)	1882	353						
s		3000						
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	941	
Potential Capacity	306	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	306	
Probability of Queue free St.	0.00	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	2235	
Potential Capacity	34	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.00
Movement Capacity	34	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity	121	442
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	121	442
Probability of Queue free St.	1.00	1.00

Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity	442	121
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	442	121
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Result for 2 stage process:		
a	0.91	0.91
y		
C t		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows	1882	
Potential Capacity	100	456
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	100	456
Part 2 - Second Stage		
Conflicting Flows	353	
Potential Capacity	668	345
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.00
Movement Capacity	668	0
Part 3 - Single Stage		
Conflicting Flows	2235	
Potential Capacity	34	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.00
Movement Capacity	34	
Results for Two-stage process:		
a	0.91	0.91
y	0.10	
C t	86	

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	263		416			
Movement Capacity (vph)	86		306			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	86		306			
Volume	263		416			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			263		416			
C(m) (vph)			86		306			
v/c			3.06		1.36			
95% queue length			25.93		21.13			
Control Delay			1032		214.9			
LOS			F		F			
Approach Delay				531.2				
Approach LOS				F				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 8/28/2012
Analysis Time Period: PM Peak Hour No Build
Intersection: US 42 & I 75 NB Ramps
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2040
Project ID: Mall Rd Interchange
East/West Street: US 42
North/South Street: Interstate 75 NB Ramps
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1250			1600	
Peak-Hour Factor, PHF		0.94			0.83	
Hourly Flow Rate, HFR		1329			1927	
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Raised curb		/ 1			
RT Channelized?						
Lanes		2			2	
Configuration		T			T	
Upstream Signal?		No			No	

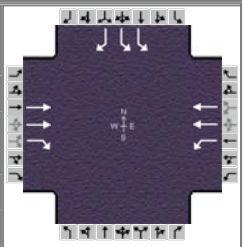
Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	200		250			
Peak Hour Factor, PHF	0.83		0.89			
Hourly Flow Rate, HFR	240		280			
Percent Heavy Vehicles	5		5			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1	1			
Configuration		L	R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config			L		R			
v (vph)			240		280			
C(m) (vph)			129		451			
v/c			1.86		0.62			
95% queue length			18.69		4.12			
Control Delay			473.2		25.2			
LOS			F		D			
Approach Delay				232.0				
Approach LOS				F				

2010 HCS Signalized Intersection Results Summary

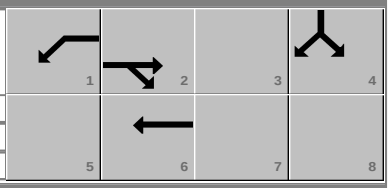
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.90
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2040	Analysis Period	1> 7:00
File Name	5 AM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1870	130	170	680					830		320

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	19.5	80.8	42.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	134.0	26.0	160.0	0.0		47.5	47.5
Change Period, *(Y+Rc)*, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.6	4.6
Queue Clearance Time *(g_s)*, s			20.0				44.0	44.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	2078	144	189	756	0	0			922	0	356
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1477	1660	1630	0	0			1597	0	1464
Queue Service time *(g_s)*, s	0.0	80.8	8.6	18.0	5.9	0.0	0.0			42.0	42.0	37.9
Cycle Queue Clearance Time *(g_c)*, s	0.0	80.8	8.6	18.0	5.9	0.0	0.0			42.0	42.0	37.9
Capacity *(c)*, veh/h		1646	746	202	2175					839	0	384
Volume-to-Capacity Ratio *(X)*	0.000	1.262	0.194	0.934	0.347	0.000	0.000			1.100	0.000	0.925
Available Capacity *(c_a)*, veh/h		1646	746	202	2175					839	0	384
Back of Queue *(Q)*, veh/ln		53.5	3.1	10.1	1.7					24.0		16.8
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		26.1	21.7	69.6	3.3					59.0	0.0	57.5
Incremental Delay *(d_2)*, s/veh	0.0	123.1	0.6	45.0	0.4	0.0	0.0			62.0	0.0	28.1
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		149.3	22.3	114.6	3.7					121.0	0.0	85.6
Level of Service (LOS)		F	C	F	A					F		F
Approach Delay, s/veh / LOS	141.0	F		25.9	C		0.0			111.2	F	
Intersection Delay s/veh / LOS	108.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	2.3	B	1.3	A				F

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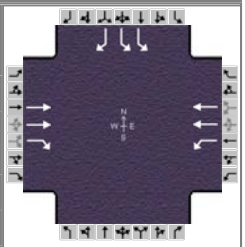
2010 HCS Signalized Intersection Results Summary

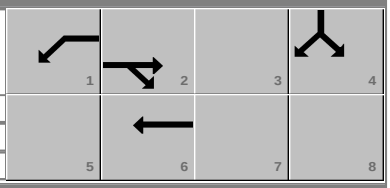
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.97
Intersection	US 42 & Interstate 75 SB F	Analysis Year	2040	Analysis Period	1> 7:00
File Name	5 PM US 42 & I75 SB Ramps.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1400	400	500	1300					500		900

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	14.5	82.8	45.0	0.0	0.0	0.0
Yellow	3.5	4.1	3.5	0.0	0.0	0.0
Red	3.0	1.6	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	0		4	4
Case Number	0.0	3.0	2.0	4.0	0.0		9.0	9.0
Phase Duration, s	0.0	139.0	21.0	160.0	0.0		50.5	50.5
Change Period, *(Y+Rc)*, s	5.0	5.7	6.5	5.7	0.0		5.5	5.5
Max Allow Headway *(MAH)*, s	0.0	0.0	4.6	0.0	0.0		4.7	4.7
Queue Clearance Time *(g_s)*, s			16.5				47.0	47.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Phase Call Probability			1.00				1.00	1.00
Max Out Probability			1.00				1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	0	1443	412	515	1340	0	0			515	0	928
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	1630	1563	1757	1630	0	0			1689	0	1548
Queue Service time *(g_s)*, s	0.0	53.6	27.7	14.5	19.7	0.0	0.0			20.7	45.0	45.0
Cycle Queue Clearance Time *(g_c)*, s	0.0	53.6	27.7	14.5	19.7	0.0	0.0			20.7	45.0	45.0
Capacity *(c)*, veh/h		1687	809	159	2114					950	0	435
Volume-to-Capacity Ratio *(X)*	0.000	0.856	0.510	3.238	0.634	0.000	0.000			0.542	0.000	2.131
Available Capacity *(c_a)*, veh/h		1687	809	159	2114					950	0	435
Back of Queue *(Q)*, veh/ln		17.8	10.7	51.7	4.2					8.8		79.8
Overflow Queue *(Q_3)*, veh/ln		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh		20.3	25.3	72.8	5.1					48.8	0.0	57.5
Incremental Delay *(d_2)*, s/veh	0.0	5.8	2.3	1023.0	1.5	0.0	0.0			0.7	0.0	516.5
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Control Delay *(d)*, s/veh		26.1	27.6	1095.8	6.6					49.5	0.0	574.0
Level of Service (LOS)		C	C	F	A					D		F
Approach Delay, s/veh / LOS	26.4	C		309.1	F		0.0			386.7	F	
Intersection Delay s/veh / LOS	229.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	1.9	A	2.9	C	2.9	C
Bicycle LOS Score / LOS	2.0	B	2.0	B				F

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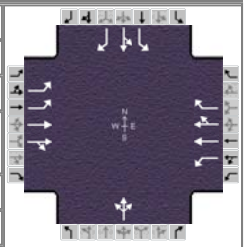
2010 HCS Signalized Intersection Results Summary

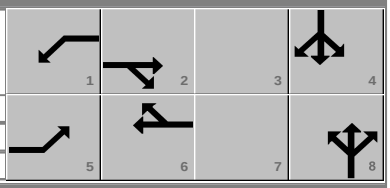
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.84
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 AM US 42 & Mall Rd with added turn lane.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	350	1750	10	10	740	250	10	30	50	200	30	140

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	5.0	13.9	70.3	26.6	12.0	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	31.9	130.0	11.5	109.6	18.5	18.5	33.1	33.1
Change Period, *(Y+Rc)*, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.7	4.7	4.7	4.7
Queue Clearance Time *(g_s)*, s	23.0		3.0		11.8	11.8	25.5	25.5
Green Extension Time *(g_e)*, s	2.3	0.0	0.0	0.0	0.2	0.2	1.1	1.1
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.07	0.07	0.63	0.63

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	417	1048	1048	12	881	298	107	0	0	238	36	167
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1541	1712	1708	1810	1712	1412	1719	0	0	1587	1900	1412
Queue Service time *(g_s)*, s	21.0	90.7	90.7	1.0	26.0	23.9	9.8	0.0	0.0	23.5	2.6	17.8
Cycle Queue Clearance Time *(g_c)*, s	21.0	90.7	90.7	1.0	26.0	23.9	9.8	0.0	0.0	23.5	2.6	17.8
Capacity *(c)*, veh/h	489	970	968	57	1504	621	129			264	316	235
Volume-to-Capacity Ratio *(X)*	0.853	1.080	1.082	0.211	0.586	0.480	0.828	0.000	0.000	0.902	0.113	0.710
Available Capacity *(c_a)*, veh/h	1355	970	968	208	1504	621	214			313	374	278
Back of Queue *(Q)*, veh/ln	8.6	39.8	40.1	0.5	9.7	8.6	4.8			11.3	1.2	6.8
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	65.5	19.6	19.7	75.6	24.0	31.9	73.0			65.4	56.7	63.1
Incremental Delay *(d_2)*, s/veh	5.2	53.1	53.9	2.2	1.7	2.6	14.8	0.0	0.0	25.7	0.2	7.2
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	70.7	72.6	73.6	77.8	25.6	34.5	87.8			91.2	56.9	70.3
Level of Service (LOS)	E	F	F	E	C	C	F			F	E	E
Approach Delay, s/veh / LOS	72.7	E		28.4	C		87.8	F		80.5	F	
Intersection Delay s/veh / LOS	61.5						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.0	C	3.0	C
Bicycle LOS Score / LOS	2.6	B	1.5	A	0.7	A	1.2	A

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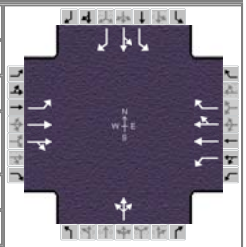
2010 HCS Signalized Intersection Results Summary

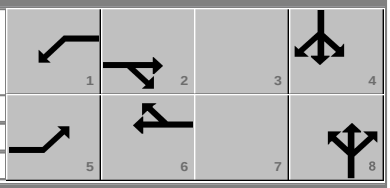
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.84
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 AM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	350	1750	10	10	740	250	10	30	50	200	30	140

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	5.0	33.5	50.7	26.6	12.0	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	51.5	130.0	11.5	90.0	18.5	18.5	33.1	33.1
Change Period, *(Y+Rc)*, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.7	4.7	4.7	4.7
Queue Clearance Time *(g_s)*, s	42.9		3.0		11.8	11.8	25.5	25.5
Green Extension Time *(g_e)*, s	2.0	0.0	0.0	0.0	0.2	0.2	1.1	1.1
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.07	0.07	0.63	0.63

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	417	1048	1048	12	881	298	107	0	0	238	36	167
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1587	1712	1708	1810	1712	1412	1719	0	0	1587	1900	1412
Queue Service time *(g_s)*, s	40.9	90.7	90.7	1.0	36.2	29.2	9.8	0.0	0.0	23.5	2.6	17.8
Cycle Queue Clearance Time *(g_c)*, s	40.9	90.7	90.7	1.0	36.2	29.2	9.8	0.0	0.0	23.5	2.6	17.8
Capacity *(c)*, veh/h	446	970	968	57	1085	447	129			264	316	235
Volume-to-Capacity Ratio *(X)*	0.934	1.080	1.082	0.211	0.812	0.665	0.828	0.000	0.000	0.902	0.113	0.710
Available Capacity *(c_a)*, veh/h	698	970	968	208	1085	447	214			313	374	278
Back of Queue *(Q)*, veh/ln	18.1	39.8	40.1	0.5	15.2	11.1	4.8			11.3	1.2	6.8
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay *(d_1)*, s/veh	56.1	19.6	19.7	75.6	42.0	47.3	73.0			65.4	56.7	63.1
Incremental Delay *(d_2)*, s/veh	15.3	53.1	53.9	2.2	6.7	7.6	14.8	0.0	0.0	25.7	0.2	7.2
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	71.3	72.6	73.6	77.8	48.7	54.9	87.8			91.2	56.9	70.3
Level of Service (LOS)	E	F	F	E	D	D	F			F	E	E
Approach Delay, s/veh / LOS	72.8	E		50.5	D		87.8	F		80.5	F	
Intersection Delay s/veh / LOS	67.8						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.5	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	2.6	B	1.5	A	0.7	A	1.2	A

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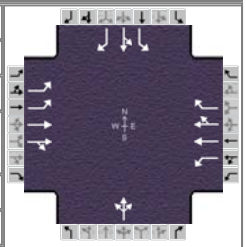
2010 HCS Signalized Intersection Results Summary

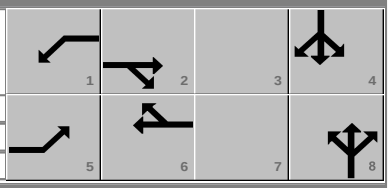
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.98
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 PM US 42 & Mall Rd with added turn lane.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	440	1190	30	50	1700	450	40	50	30	580	30	850

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	6.6	13.5	63.3	31.5	12.9	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	33.1	127.5	13.1	107.5	19.4	19.4	38.0	38.0
Change Period, $(Y+R_c)$, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time (g_s), s	25.2		6.5		12.8	12.8	33.5	33.5
Green Extension Time (g_e), s	1.4	0.0	0.1	0.0	0.1	0.1	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.34		0.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	449	625	620	51	1735	459	122	0	0	592	31	867
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1515	1712	1697	1810	1712	1388	1790	0	0	1560	1900	1388
Queue Service time (g_s), s	23.2	34.8	35.4	4.5	63.3	47.8	10.8	0.0	0.0	31.5	2.1	31.5
Cycle Queue Clearance Time (g_c), s	23.2	34.8	35.4	4.5	63.3	47.8	10.8	0.0	0.0	31.5	2.1	31.5
Capacity *(c)*, veh/h	504	892	884	74	1355	549	144			307	374	273
Volume-to-Capacity Ratio *(X)*	0.892	0.701	0.702	0.685	1.280	0.836	0.850	0.000	0.000	1.927	0.082	3.174
Available Capacity (c_a), veh/h	618	892	884	312	1355	549	168			307	374	273
Back of Queue *(Q)*, veh/ln	9.8	12.3	12.6	2.3	48.6	18.3	6.1			49.0	1.0	86.0
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	65.3	17.0	17.6	75.7	37.8	43.6	72.6			64.3	52.4	64.3
Incremental Delay (d_2), s/veh	13.7	4.6	4.6	12.6	132.0	14.0	29.5	0.0	0.0	429.0	0.1	987.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	79.0	21.6	22.2	88.3	169.8	57.7	102.1			493.3	52.6	1052.0
Level of Service (LOS)	E	C	C	F	F	E	F			F	D	F
Approach Delay, s/veh / LOS	37.0	D		145.0	F		102.1	F		809.5	F	
Intersection Delay s/veh / LOS	289.5						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.0	C	3.0	C
Bicycle LOS Score / LOS	1.9	A	2.3	B	0.7	A	2.9	C

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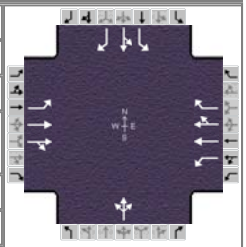
2010 HCS Signalized Intersection Results Summary

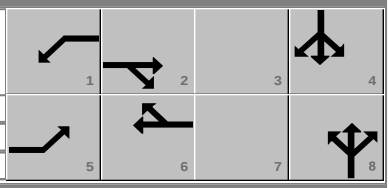
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 27, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.98
Intersection	US 42 & Mall Rd	Analysis Year	2040	Analysis Period	1> 7:00
File Name	6 PM US 42 & Mall Rd.xus				
Project Description	Mall Rd Interchange PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	440	1190	30	50	1700	450	40	50	30	580	30	850

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	6.6	19.5	57.3	31.5	12.9	0.0
Yellow	3.5	3.5	4.2	3.5	3.5	0.0
Red	3.0	3.0	2.0	3.0	3.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	2.0	4.0	2.0	3.0	12.0	12.0	9.0	9.0
Phase Duration, s	39.1	127.5	13.1	101.5	19.4	19.4	38.0	38.0
Change Period, $(Y+R_c)$, s	6.5	6.2	6.5	6.2	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	4.6	0.0	4.6	0.0	4.6	4.6	4.7	4.7
Queue Clearance Time (g_s), s	34.6		6.5		12.8	12.8	33.5	33.5
Green Extension Time (g_e), s	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.00		1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	449	625	620	51	1735	459	122	0	0	592	31	867
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1560	1712	1697	1810	1712	1388	1790	0	0	1560	1900	1388
Queue Service time (g_s), s	32.6	34.8	35.4	4.5	57.3	50.8	10.8	0.0	0.0	31.5	2.1	31.5
Cycle Queue Clearance Time (g_c), s	32.6	34.8	35.4	4.5	57.3	50.8	10.8	0.0	0.0	31.5	2.1	31.5
Capacity *(c)*, veh/h	318	892	884	74	1226	497	144			307	374	273
Volume-to-Capacity Ratio *(X)*	1.412	0.701	0.702	0.685	1.415	0.924	0.850	0.000	0.000	1.927	0.082	3.174
Available Capacity (c_a), veh/h	318	892	884	312	1226	497	168			307	374	273
Back of Queue *(Q)*, veh/ln	30.7	12.3	12.6	2.3	54.6	20.8	6.1			49.0	1.0	86.0
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh	63.7	17.0	17.6	75.7	41.8	49.3	72.6			64.3	52.4	64.3
Incremental Delay (d_2), s/veh	203.1	4.6	4.6	12.6	191.6	25.3	29.5	0.0	0.0	429.0	0.1	987.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	266.8	21.6	22.2	88.3	233.4	74.5	102.1			493.3	52.6	1052.0
Level of Service (LOS)	F	C	C	F	F	E	F			F	D	F
Approach Delay, s/veh / LOS	86.8	F		197.6	F		102.1	F		809.5	F	
Intersection Delay s/veh / LOS	325.9						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.5	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.9	A	2.3	B	0.7	A	2.9	C

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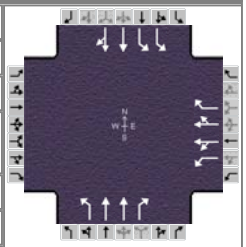
2010 HCS Signalized Intersection Results Summary

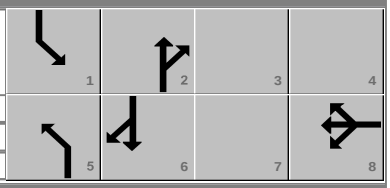
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	AM Peak Hour No Build	PHF	0.84
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2040	Analysis Period	1> 7:00
File Name	7 AM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				110	70	160	20	340	350	160	230	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	3.4	69.7	22.3	0.0	0.0
Yellow	3.5	0.0	4.4	4.0	0.0	0.0
Red	3.0	0.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		28.2	28.2	12.5	104.1	15.9	107.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.2	6.2	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			19.1	19.1	3.7		8.7	
Green Extension Time (g_e), s	0.0		3.2	3.2	0.1	0.0	0.7	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			0.03	0.03	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			131	83	190	24	405	417	190	143	142
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1436	1508	1278	1587	1587	1533	1673	1667	1642
Queue Service time (g_s), s	0.0			9.8	2.8	17.1	1.7	4.2	18.8	6.7	2.2	2.4
Cycle Queue Clearance Time (g_c), s	0.0			9.8	2.8	17.1	1.7	4.2	18.8	6.7	2.2	2.4
Capacity *(c)*, veh/h				267	562	238	79	1843	890	262	1015	1000
Volume-to-Capacity Ratio *(X)*	0.000			0.490	0.148	0.800	0.300	0.220	0.468	0.728	0.141	0.142
Available Capacity (c_a), veh/h				479	1005	426	685	1843	890	858	1015	1000
Back of Queue *(Q)*, veh/ln				3.7	1.0	6.2	0.7	1.3	6.7	2.9	0.8	0.9
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				43.7	40.9	46.7	55.0	6.2	14.5	54.1	4.6	5.1
Incremental Delay (d_2), s/veh	0.0			2.9	0.3	12.3	2.1	0.3	1.8	3.9	0.3	0.3
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				46.7	41.1	59.0	57.1	6.4	16.3	57.9	4.9	5.4
Level of Service (LOS)				D	D	E	E	A	B	E	A	A
Approach Delay, s/veh / LOS	0.0			51.3	D		12.7	B		26.3	C	
Intersection Delay s/veh / LOS	25.5						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			0.8	A	1.2	A	0.9	A

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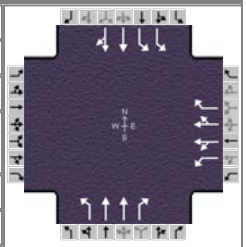
2010 HCS Signalized Intersection Results Summary

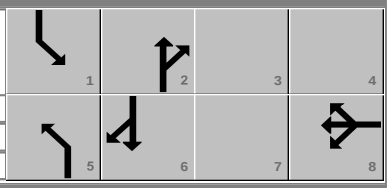
General Information				Intersection Information	
Agency	Qk4			Duration, h	0.25
Analyst	JJL	Analysis Date	Aug 24, 2012	Area Type	Other
Jurisdiction	KYTC	Time Period	PM Peak Hour No Build	PHF	0.97
Intersection	Mall Rd & I 75 Ramps	Analysis Year	2040	Analysis Period	1> 7:00
File Name	7 PM Mall Rd & I-75 Ramps.xus				
Project Description	Mall Rd Interchange Existing PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				350	150	600	50	650	100	250	650	50

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	0.0	82.9	35.0	0.0	0.0
Yellow	3.5	3.5	4.4	4.0	0.0	0.0
Red	3.0	3.0	1.8	1.9	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7		8	8	5	2	1	6
Case Number	0.0		9.0	9.0	2.0	3.0	2.0	4.0
Phase Duration, s	0.0		40.9	40.9	13.5	130.0	20.0	136.5
Change Period, $(Y+R_c)$, s	5.0		5.9	5.9	6.5	6.2	6.5	6.2
Max Allow Headway *(MAH)*, s	0.0		6.2	6.2	4.1	0.0	4.1	0.0
Queue Clearance Time (g_s), s			37.0	37.0	6.9		13.0	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.1	0.0	0.5	0.0
Phase Call Probability			1.00	1.00	1.00		1.00	
Max Out Probability			1.00	1.00	0.00		0.27	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			361	155	619	52	670	103	258	365	356
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1331	1397	1184	1560	1559	1579	1723	1638	1596
Queue Service time (g_s), s	0.0			35.0	6.7	35.0	4.9	11.9	4.7	11.0	9.8	11.0
Cycle Queue Clearance Time (g_c), s	0.0			35.0	6.7	35.0	4.9	11.9	4.7	11.0	9.8	11.0
Capacity *(c)*, veh/h				310	652	276	73	1723	872	311	976	951
Volume-to-Capacity Ratio *(X)*	0.000			1.162	0.237	2.239	0.706	0.389	0.118	0.829	0.374	0.375
Available Capacity (c_a), veh/h				310	652	276	407	1723	872	439	976	951
Back of Queue *(Q)*, veh/ln				20.5	2.4	54.1	2.2	3.7	1.8	5.2	3.2	3.6
Overflow Queue (Q_3), veh/ln				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uniform Delay (d_1), s/veh				57.5	46.7	57.5	70.5	10.4	16.1	67.1	7.2	8.4
Incremental Delay (d_2), s/veh	0.0			102.6	0.4	569.1	11.7	0.7	0.3	8.9	1.1	1.1
Initial Queue Delay (d_3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh				160.1	47.1	626.6	82.2	11.1	16.4	75.9	8.3	9.5
Level of Service (LOS)				F	D	F	F	B	B	E	A	A
Approach Delay, s/veh / LOS	0.0			399.1		F	16.2		B	26.6		C
Intersection Delay s/veh / LOS	167.5						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS			1.4	A	1.2	A	1.3	A

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